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23 June 1982

## USSR REPORT

## ENERGY

No. 103

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## ELECTRIC POWER

### CEMA NATIONS EXCHANGE ELECTRIC POWER

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian  
No 3 Mar 82 pp 68-72

/Article by Yuriy Savenko, Standing Representation at CEMA, and Mikhail Samkov, CEMA Secretariat: "Tendencies in the Development of Exchanging Electric Power Between the Power Systems of the European Nations"7

/Text/ "Life requires fruitful cooperation of all governments on behalf of the solution of peaceful and constructive tasks, which each people and all humanity is facing" - L. I. Brezhnev.

The high level of the development of the economic potential of the governments of Europe and the differences in their natural resources and territorial proximity are opening up significant opportunities for international cooperation in various fields, particularly in the field of power engineering.

In the Concluding Act of the Conference on Security and Cooperation in Europe, which was held in Helsinki in 1975, the participating governments noted the possibility of developing a long-term cooperation by joining efforts to solve several large-scale projects, including those connected with the development of exchanging electric power.

The soundness of this proposal is determined by several interconnected prerequisites, including:

-the high growth rates in the consumption of electric power in the industrially developed nations of Europe, which exceed the growth rates of the consumption of primary fuel and power resources. According to available evaluations, the percentage of power resources expended in these nations for the generation of electric power will reach 50 percent of their total consumption by the end of the century. (Presently, this figure is approximately 30 percent.);

-the imbalanced distribution of power resources. Due to natural conditions the basic European fuel and power resources are found in the eastern portion of the continent. According to data of the European Economic Commission of the United Nations Organization, the CEMA

nations (including the USSR) contain more than 80 percent of the proven supplies of mineral fuel in Europe;

-the technological and economic characteristics of electric power, in particular the practical coincidence in time between its production and consumption, the comparatively constant quality of electric power and the possibility of the relatively rapid influencing of its characteristics (frequency and voltage). Due to these properties electric power has a priority for its use in lighting, telecommunications, and in several technological processes. At present the conversion into electricity is almost the only way to make practical use of such primary power resources as hydroresources and nuclear energy. This also includes the predominant trend in making use of the power potential of coal, particularly low grade coal;

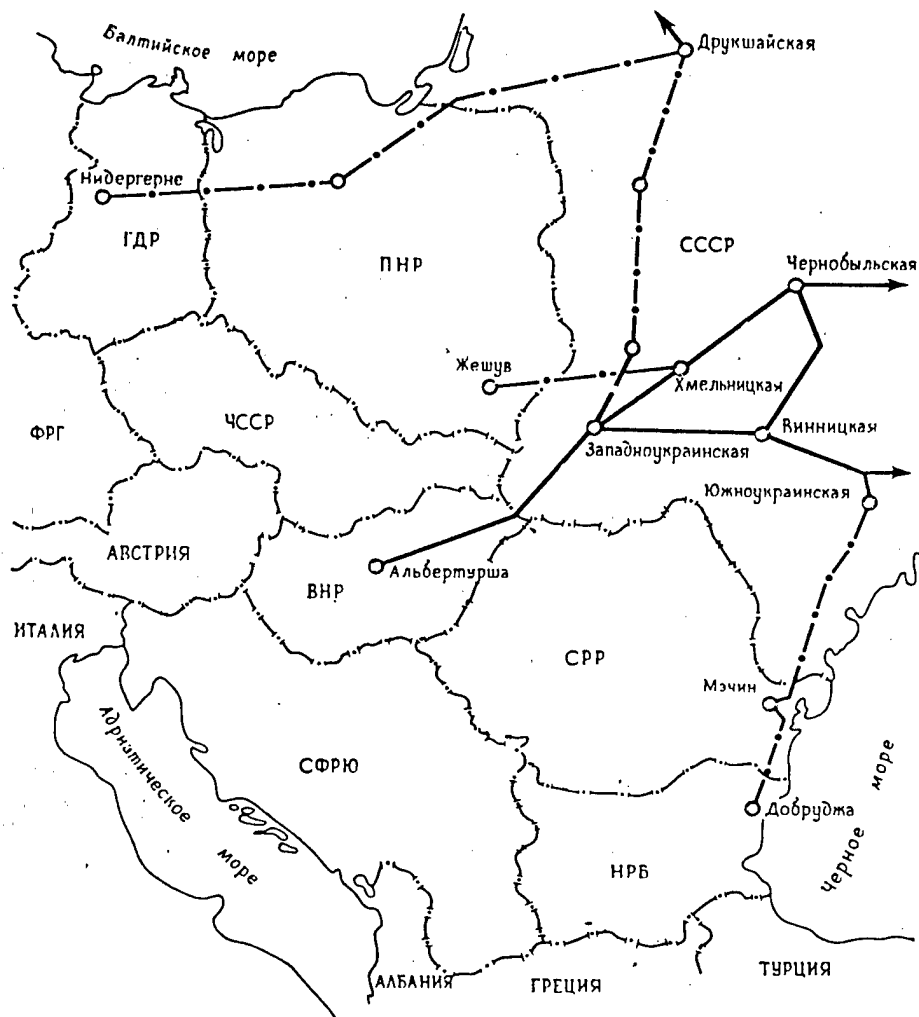
-the technical-economic advantages of the joint work of the unified power systems (OES) of a national and international importance. In addition to realizing the planned deliveries and exchange of electric power, there is a need to single out the possibility of rendering assistance in the event of unforeseen circumstances, of providing for a shared reserving of power systems, and of using the savings from the exchange of capacities and power by taking into consideration the time of day, season, and other considerations.

The high efficiency of the joint operation of the unified power systems is confirmed by the practical activity of the OES of the CEMA nations. By the end of 1980 the total installed rated capacity of the electric power stations working in parallel within the OES (the USSR - the unified power systems of the South) exceeded 137 million kW. The output of electric power amounted to nearly 669 billion kWh. In December 1980 the savings from the combining of the operating electric load schedules exceeded 2,000 MW.

The exchange of electric power within the OES between the power systems of the CEMA member nations, who are participants in the Central Dispatch Administration in Prague, in 1980 reached 31.7 billion kWh (1970 - 13.2 billion kWh; 1960 - 1.7 billion kWh). By the end of 1980 there were 31 intersystem power transmission lines with a voltage of 110 kV and higher between the Central Dispatch Administration participating nations and between them and Yugoslavia. There are also intersystem 220 kV power transmission lines extending into Austria (from Hungary and Czechoslovakia) and Turkey (from Bulgaria).

One of the main factors which determine the reliability of the power supply of the OES's is the adequate throughput capacity of the inter-governmental power lines and the systems-forming networks. Special attention is being given to the development of these electrical ties by the CEMA nations. Research, which was conducted while developing a General plan for the future development of the OES's for the CEMA member nations, has shown that before 1990 the construction of 750 kV intersystem power transmission lines with a large throughput capacity is the best direction to take. This work was done within the framework of the Standing Commission of the CEMA on cooperation in the field of electric power.

Diagram showing the main LEP-750s already built and those to be constructed in the near future.



In 1979 the first of these power transmission lines was put into operation. This was the Vinnitsa (USSR) to Al'bertirsha (Hungary) LEP-750, which has a total length of 838 kilometers (570 km within the USSR and 268 km in Hungary).

In accordance with the General Plan it is planned to build other 750-kV LEPs, including a line from the Khmel'nitskaya atomic electric power station (USSR) to Rzeszow (Poland), the technical design work on which is now coming to an end; the Yuzhnaya /Southern/ LEP (USSR - Romania - Bulgaria); and the Severnaya /Northern/ LEP (USSR - Poland - East Germany).

The construction of these and other intersystem 750 kV LEPs will make it possible to provide a high degree of reliability of the unified power systems and will create conditions for the more complete utilization of the intersystem savings.

In addition to the unified power systems of the CEMA member nations there are at present West European power alliances (associations): the SKPPE (Austria, Belgium, West German, Italy, Luxemburg, the Netherlands, France and Switzerland); NORDEL' (Denmark, Norway, Finland, Sweden and Spain ); and YuFIPTE (Spain, Portugal and France).

The amount of the electric power exchange between the power systems of the European nations exceeded 100 billion kW-hours in 1980.

Preliminary estimates, which we compiled, \* have shown the clear practical efficiency of accomplishing electric connections between the unified power systems of the CEMA nations and the West European nations. According to these estimates the creation of electric power connections, for example, between the OES's of the CEMA nations and the SKPPE participating nations, in addition to providing direct deliveries of capacity and electricity, will make it possible to conserve capacity by combining the daily load schedules (an operational exchange) on the order of 9,500 MW and by using the reserves - approximately the same amount (as it applies to the level of development of the maximum load within the OES of the European portion of the USSR's Unified Power System - 330,000 MW; and within the OESs of the remaining European CEMA nations - nearly 175,000 MW; and within the SKPPE OESs - 305,000 MW).

The distribution of the estimated capacity flows, formed at this time according to conditions of the operational exchange and from decreasing the needed emergency reserve, is shown in Table 1.

Table 1 (in thousands of megawatts)

Indicators	OES of the SKPPE participants	OES of the CEMA participants	OES of the European portion of the USSR
Capacity transfers from combining the load schedules and decreasing emergency reserve	7.2	4.1	7.7
Peak of OES of European portion of USSR's Unified Power System (16 hrs in Cent. Eur. time)	10.4	2.7	7.7
Peak of CEMA OEW (17 hrs in Cent. Eur. time)	3.2	4.1	7.3
Peak of SKPPE OES (10 hrs in Cent. Eur. time)	7.2	6.8	.4

\* "Elektricheskiye stantsii", 1971, No 4, pp 3-11.

At present the conditions already exist for the gradual realization of the possibilities to develop an exchange of electric power and capacities between the power systems of the European nations.

In a speech given by the head of the Soviet delegation at the 11th Congress of the World Power Conference (MIREK), which was held in Munich, West Germany in September 1980, Comrade P. S. Neporozhnyy pointed out that the task of combining the power systems of Eastern and Western Europe is clearly of significant economic and production-technical importance. Moreover, the creation of electric power connections with an adequate throughput capacity and a system of commerce and exchange of electricity between the power associations of Eastern and Western Europe would make it possible to significantly reduce the need for installed rated capacity of power stations within the associations and to produce electricity wherever it is most convenient and advantageous to do so. It was noted that an important aspect of the cooperation could be the combining of efforts of all participating nations in the construction of large power facilities common to all. This would include power stations with assemblies with a large per-unit capacity and power transmission lines with a large throughput capacity.

At the 11th Congress of MIREK the Secretariat of the European Economic Commission of the United Nations Organization presented estimates on the possibilities of exchanging electric power between the power systems of the Eastern and Western European nations. These estimates derived from the probability of exporting electricity from the USSR into the power systems of Eastern and Western Europe in amount approaching 40 to 50 billion kW-hours by 1990. The requirement of the West European nations for deliveries of electricity from the eastern portion of the continent is estimated at 10 billion kW-hours. In connection with this the specialists of the Secretariat of the European Economic Commission of the United Nations Organization allow for the sizes of the exchange between the power systems of the Eastern and Western European nations in the year 1990 (deliveries and planned operational exchange balanced over a specific period of time) as given in Table 2. Moreover, the accomplishment of the exchange is connected with the possibilities and conditions of the transit of the electric power supplied by the Soviet Union through the networks of the appropriate CEMA nations. In the estimates of the Secretariat of the European Economic Commission of the United Nations Organization another possibility is considered - the combining of the power systems of the USSR with the power systems of the West European nations by means of latitudinal major power lines with a large per-unit throughput capacity.

The above cited estimates are preliminary because in accordance with agreements of the nations participating in the conference (1975) in Helsinki within the framework of the Committee of the European Economic Commission of the United Nations Organization on Electric Power it is planned to do further research on the questions of the possible joining of the power systems of West and East Europe.

Table 2

Power systems	Amount of power exchange in billions of kW-hours			Transferred capacity - total in thousands of MW
	From eastern systems to western	From western systems to eastern	Total	
Northern Europe				
USSR - Finland	3	1.5	4.5	1.3
Central Europe				
GDR - FRG	3.4	.2	3.6	1
Czechoslovakia - West Germany	3	2	5	1
Czechoslovakia - Austria	5	4	9	1.45
Hungary - Austria	5	4	9	1.5
Southern Europe				
Romania - Yugoslavia	.5	.5	1	.85
Bulgaria - Yugoslavia	1.5	.5	2	.6
Bulgaria - Greece	1.5	1.1	2.6	.6
Bulgaria - Turkey	1	.7	1.7	.68
USSR - Turkey	.6	.4	1	.36
Total	24.5	14.9	39.4	9.34

To ensure the timely execution of this work to determine the method and primary tasks of this research and its program, the Secretariat of CEMA has developed and sent to the Committee on Electric Power of the European Economic Commission of the United Nations Organization several methodological documents. These documents include Some methodological positions connected with the formation and development of system-forming networks of the unified power systems and Some considerations on the design for the organization of work on problems connected with the execution of the research concerning the development of international combining of power systems.

The proposals of the CEMA Secretariat on the method and program of research were basically approved by the Committee on Electric Power of the European Economic Commission of the United Nations Organization at the 36th Session (November 1977). In accordance with these proposals the selection of solutions for the construction of electric power connections between the power systems of the nations of West and East

Europe is to be accomplished by a variant comparison; in other words it is to be done by a method of technical-economic analysis of the various alternatives for the development of the inter-system electric power connections and the national power transmission lines that are interconnected with them.

In selecting a variant from the number of needed inter-system power transmission lines the key issue is whether they provide an adequate throughput capacity. Existing, planned or estimated loads for the main assemblies of the power systems and the available recommendations for the development of generating capacities over the period of time being examined serve as the initial data. On the basis of these data possible capacity (and electric power) flows between the main assemblies of the power systems in all operating modes at various stages of their development, which serve as the basis for the selection of a layout and parameters of the intersystem LEPs and the main power transmission lines of the national systems, are discovered.

As the main planned mode the capacity flows, which are determined in the hours of the combined load maximum as the sum of the planned transfers of capacity in this period, serve as the estimated electric power loads. This includes the transfers caused by combining the load schedules and by deviations of the actual capacity balances from the planned assumptions.

At present in the power systems of the nations of Western and Eastern Europe there are differing requirements upon the level of sustaining frequency in the power systems and upon the principles of controlling and regulating capacity transfers along inter-system power transmission lines. In accordance with the method of the CEMA Secretariat, which was presented to the European Economic Commission of the United Nations Organization, there are several possible ways of executing the inter-system power transmission lines. They include:

- short inter-system alternating current 400 kV connections. This variant makes it possible to basically accomplish the exchange of electricity between bordering regions and, consequently, is a local transaction, while operating in an "insular" mode or through insertions of direct current;

- 750 kV alternating current power transmission lines. This variant assumes the formation of the main network of the power associations of the nations of Western and Eastern Europe at an alternating current of 750 kV;

- mainline electric power connections of an alternating current at 1,150 kV. This variant presupposes the use of a Trans-European power transmission line at a 1,150 kV as the inter-system connection. It is also necessary to have intermediate substations in different regions of Europe;

-direct current 1,500 kV ( $\pm$  750 kV) electric power connections. This variant calls for the construction of inter-system Trans-European 1,500 kV power transmission lines with two or three intermediate substations, which provide a reverse transmission of electricity between the power systems of the nations of Western and Eastern Europe;

-rectifier-invertor units (inserts of direct current). This variant considers the use of connected power systems (the networks of which operate on an alternating current) at border substations. It ensures the independent operation of the power systems according to conditions of sustaining the frequency level;

-the joint use of both direct current and alternating current power transmission. This variant derives from the construction of direct current 1,500 kV ( $\pm$  750 kV) power transmission lines and several short connections of 400 kV alternating current.

Considering the interest of several European nations in the development of electric power exchanges at their borders, cooperation in the field of the joint operation of their power systems will, in all probability, develop comprehensively along several of the above mentioned directions. The realization of these directions must be accomplished according to a coordinated program which takes into consideration their technical compatibility and which ensures the maximum economic savings.

At present based upon the technical opportunities for constructing inter-system power transmission lines, the requirements for the quality of electric power, and the mode and other conditions, the most realistic variant for combining the power systems of the nations of Western and Eastern Europe is the use of direct current inserts at border substations (rectifier-invertor substations) with the needed amplification of the internal network of the national power systems.

It must be emphasized that today in Europe proposals for several inserts of direct current are at various stages of coordination and realization. For example, such an insertion between the power systems of the USSR and Finland has already been built and is now being put into operation; the insertion has a throughput capacity of 1,000 MW. An agreement has been reached between Czechoslovakia and Austria to build a direct current insert with a throughput capacity of 550 MW between their power systems - at the Dyrnror substation; this project is to be put into operation in 1983.

Proposals are being studied which describe the construction of indirect current inserts between the power systems of Bulgaria and Yugoslavia and Hungary and Yugoslavia. The decision has been made to construct the same kind of insert between the power systems of Bulgaria and Greece.

The construction of direct current inserts at substations of the inter-system power transmission lines is the initial stage in organizing the joint operation of large European power associations. It

does not eliminate the possibility and advisability of building powerful main-line power transmission lines at a later time. For it is such power lines that are capable of ensuring the growing number of transit planned deliveries of capacity and electricity and to maximize the use of the technical-economic advantages of the joint operation of the power systems (in particular, the savings from combining load schedules and reducing the required emergency reserve, etc.).

Based upon the experience that has accumulated in designing alternating current 1,150 kV power transmission lines and direct current 1,500 kV power lines within the framework of the Committee on Electric Power of the European Economic Commission of the United Nations Organization, the principle technical solutions and several economic aspects of the possible construction of powerful extensive mainlines, which will be used to realize the joint operation of the power systems of the nations of Western and Eastern Europe, have been studied.

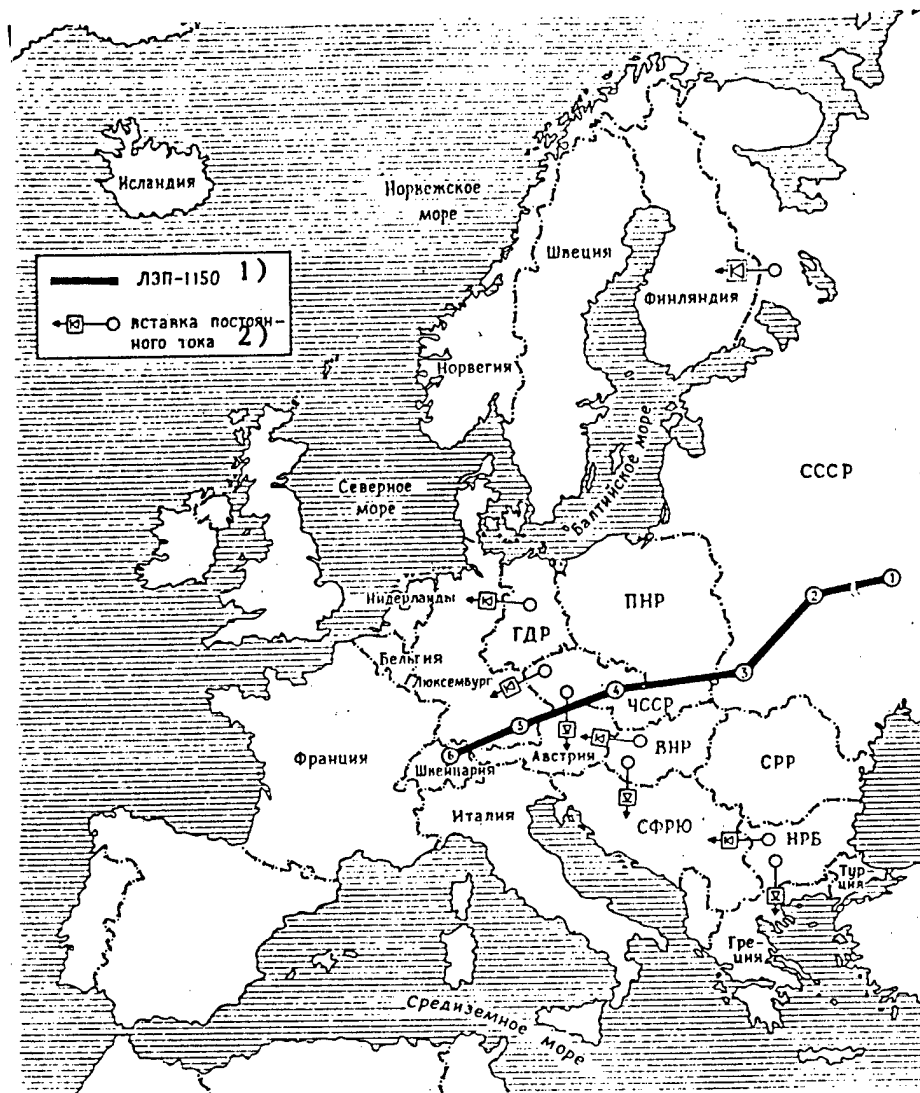
This concerns primarily electric power transmissions:

- at an alternating current of 1,150 kV on the route from Kursk (1) - Kiev (2) - L'vov (3) - Gotval'dov (4) - Munich (5) - Laufenburg (6) for a distance of 2,400 kilometers (see Drawing);
- at a direct current of 1,500 kV along the same route with intermediate substations in the western portion of the USSR (approximately in the area of L'vov) and in Czechoslovakia;
- from the western regions of the USSR into Switzerland a 1,500 kV direct current power transmission line has been built in combination with a double-circuit 750 kV alternating current power transmission line through the USSR with one intermediate substation in Czechoslovakia.

Analysis that was performed within the framework of the Committee on Electric Power of the European Economic Commission of the United Nations Organization has shown that the modern level of development of equipment makes it possible to create inter-system mainline power transmission lines from the East to West of a distance of nearly 2,400 kilometers to realize the inter-system savings amounting to nearly 6,000 MW (and providing possible planned deliveries of electricity) for both direct and alternating currents.

Organizing the possible joint operation of the power systems of the nations of Western and Eastern Europe is a complex and long-lasting process. For it to become a reality it is necessary to solve several problems. In particular, it is necessary to study the possibilities of equalizing the daily load schedules by the transfers of capacity between the power systems, the development and use of peak generating capacities. It is also necessary to develop and coordinate proposals regarding specific questions that are connected with the possible exchange of electricity between their power systems, including the construction of inter-system power transmission lines.

Principle layout of several variants of power transmission lines between the power systems of the CEMA nations, SKPPE and Nordel'



Key: 1) LEP-1150; 2) Direct current insert.

The further development of powerful power systems and their parallel operation pose several problems in the field of the methodology of selecting a rational structure for the system-forming network and the inter-system power transmission lines, the theory of reliability, also the management of the modes of the intersystem power transmission lines, the changes in load and generating conditions within the power systems, and the stability of the power transmission lines, etc.

The need for a comprehensive solution of these problems requires the development of an appropriate scientific-technical concept, which must receive the needed attention during the formulation of the basic directions for the cooperation of the involved nations in the very near future.

The coordination of the basic principles and the organization of the necessary design and research work, connected with the solution of problems in developing the exchange of electricity between the power systems of the nations of Western and Eastern Europe, may require the conclusions in the work of the European Economic Commission of the United Nations Organization of an appropriate multilateral agreement with the participation of the involved governments of the nations-members of the European electric power organizations (in particular the Central Dispatch Administration of the CEMA Unified Power System) with the establishment of promises from these international organizations as regards the topic of coordination.

The principle and organizational positions on cooperation on this matter, just as on other power industry problems (in particular reusable sources of energy, protecting the environment, the development of new methods of generating, transforming and transmitting energy), could be a topic of discussion not only in sessions of the Committee on Electric Power of the European Economic Commission of the United Nations Organization, but also at the proposed European-wide conferences in this field. This would be a significant contribution to fulfilling the decisions of the Concluding Act of the conference in Helsinki.

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## FUELS

### SHALE OIL OFFICIAL ON SHALE RESERVES

Tallinn RAHVA HAAL in Estonian 18, 20 Feb 82

[Article by Agu Aarna, corresponding member, ESSR Academy of Sciences, chairman of program council for comprehensive oil shale use: "How Rich Are We? The Scientific-Technical Program of Comprehensive Oil Shale Usage"]

[PART I, 18 Feb 82 p 2]

[Text] Scientific research of Estonian oil shale goes back a hundred years, and its practical use can soon celebrate its 60th anniversary. During this period thousands of scholarly articles have been published, many books have been printed, plans have been made at conferences on various levels, and numerous decisions have been made. And there have been practical results: The ESSR is the largest processing republic of oil shale (oil shale being processed into oil and gas), the two largest generating plants using oil shale are located in our republic. Now that the republic's government has approved the scientific-technical program for a comprehensive oil shale usage there is reason to analyze differences that may exist between it and previous work, and the results expected from the realization of the program.

The research and experiments included in the program are designed to unite all forces dealing with the subject and direct them at fixed goals. Geologists, mining engineers, chemists, energy specialists, technologists, economists, natural scientists, physicians, etc. take part in the program. The reason for collecting research into a program lies in the fact that with the growth of oil shale production and use qualitatively new problems have arisen. These are based on the need to create new and powerful complexes for oil shale exploitation, exceeding current ones in profitability and productivity, to raise the level of oil shale production by reducing losses and using lower quality oil shale, and to prevent or minimize the conflicts that unavoidably arise between production and the environment. The question of oil shale research and use has not been analyzed from this angle, since the time has not been ripe, and many factors had to be fixed precisely.

The first problem associated with the comprehensive use of oil shale derives from the location of the oil shale deposits. Oil shale is deposited in the ground only in 2.5-3 meter layers. On the surface there are forests, peat bogs, bodies of water, and agricultural land. With the mining moving toward

Rakvere we encounter dichtyonema and phosphorite deposits that are located beneath the oil shale layer. If the enterprises mining oil shale were previously able to deal strictly with their own problems, they must now consider what will happen to ground water and bodies of water, what will be the future of arable lands and forests, how to keep in step with peat digging. There are completely novel problems when oil shale and phosphorite deposits are co-located. It is unthinkable that phosphorite should be sacrificed for oil shale or vice versa. Both must be mined and this dictates that many problems must be solved. The usable deposits of oil shale can be greatly increased with the mining of lower quality shale at the edges of the deposits. Energy specialists and technologists must, however, be prepared to receive such oil shale, since the use of poorer oil shale will raise new technical and economic questions. Land used for mining must be restored and returned to the previous holders. The restoration of the surface is a very important task which requires the use of new technical procedures and devices. This can take place in close cooperation with specialists from agriculture and forestry, and these tasks are outlined in the comprehensive program.

Oil shale is an ash-producing fuel, with only one third being combustible, two thirds consisting of mineral matter. Even during mining the limestone layers must be separated from the oil shale, and a place must be found for storing the limestone. As a result gigantic slag mountains rise in the neighborhood of the mines, taking up space and changing the original contours of the land. The limestone can be used for gravel, but its quality does not meet the standards for construction use. The reasons for this lies in the admixture of clay and oil shale which has a negative impact on the character of the gravel. During oil shale use in generating stations or distilleries more than half of the oil shale volume is left as dry residue, which must again be used or placed into nature. Over the years ash and coke hills have grown up in the vicinity of oil shale industry, having no future use. Now almost one third of the ash from the generating stations is being used for liming acid soils and for manufacture of construction materials. This is of course a good solution, but currently it cannot be expanded indefinitely--the problem lies with railroad capacity and the number of special ash cars. For some time then we must reconcile ourselves to a continued growth of the ash mountains and try to make sure that precipitation will not wash out substances that could harm the environment. The great mineral content of oil shale requires that simultaneous uses be found for both the combustible and the mineral parts. Previous oil shale technology did that only to a limited degree; during the application of the comprehensive program this will be a task of primary importance.

In spite of the large mineral content oil shale has the advantage that a very high percentage of the organic part can be converted into oil shale oil and gas by heating. This is the reason why oil shale is considered to be a primary raw material substitute for petroleum. The world oil supply is rapidly diminishing and oil production is becoming more cumbersome and expensive, since it is shifting to open oceans and far northern regions. Experts estimate that the oil content of oil shale exceed natural petroleum reserves five-fold. But there are great differences in producing petroleum and oil shale oil. For petroleum a well must be dug and the collected oil pumped out, while

for oil shale oil production shale mines must be established, the mined substance must be hauled to the place of usage, distilleries must be built, ways found to store the dry residue without harming the environment--and only from that moment on do we have a petroleum substitute. Currently oil production from shale is some 60 percent more expensive than petroleum production, but the difference is constantly diminishing and during the 90s it will disappear or even become favorable for oil shale.

If the oil shale has the task of being at least a partial petroleum substitute, then it is high time to think of devices that could meet this task. In the early days of the Estonian oil shale industry oil shale generators with a daily processing capacity of 30-35 tons of oil shale were put into use. In the meantime we have arrived at plants that can process 200-220 tons per day, and a new type with a capacity of 1,000 tons has been designed. In the distillation of pulverized oil shale a device capable of processing 3,000 tons per day is in the demonstration phase. But oil shale distillation is not a process that can be mechanically expanded by enlarging the measurements of the processing device. Larger production capacity causes totally new problems in the field of exploitation and production quality, and these must be solved by persistent and patient work.

Throughout the world there is intensive work carried on in building new oil shale processors and testing their industrial use. Our oil shale technology has valuable experiences and new ideas that must be tested. These tasks have also been outlined in the comprehensive use program.

[PART II, 20 Feb 82 p 2]

[Text] Two main directions characterize our oil shale use--burning to obtain energy, and distillation to obtain oil and gas. One of the key problems for the comprehensive program lies of course in the future use of oil shale. Currently about 80 percent of the mined oil shale is used for energy production, 20 percent for distillation. This proportion has developed for natural cause--first, the North-West USSR region is poor in energy resources, second, there was no other way except direct combustion to use the pulverized oil shale that was a byproduct of mining, since the entire world's solid fuel technology lacked up to very recent time any process for distillation of pulverized fuel.

Recent years have markedly changed these objective reasons. The 26th CPSU Congress adopted a decision for preferential development of atomic energy, and this projects that the energy needs of the North-West will be largely met by nuclear plants to be constructed. But even nuclear stations do not provide a complete answer, since they must work on the basis of a constant load. During peak energy consumption periods relief stations are needed, working either on the basis of waterpower or thermal energy. There are no suitable sites for waterpower exploitation in the USSR North-West, and apparently the current thermal generating stations must assume a new task--to guarantee electrical energy supply during peak demand.

The simplest solution would be to build these relief stations so that they burn oil or natural gas, but neither of these fuels can be used since their

supplies are inadequate. So the relief stations must be built to burn oil shale, but this in turn is involved with many technical problems. There is a saying that oil shale burns well, but it is hard to burn. In oil shale combustion the entire mineral portion goes through the burning chamber, causing contamination of chambers walls, corrosion, and wear. In 1980 a team of engineers, constructors and scientists were decorated with the USSR state prize for developing a solution for oil shale use in the Estonian Thermal Energy Station. The results obtained give reason to hope that the construction tasks for the new relief station assembly will be solved. In the relief station the amount of oil shale burned will not increase significantly, but the output of the relief station will increase.

But the second tasks of the oil shale industry, oil production, has not been dropped from the agenda nor has its importance diminished. This and the next five year plans mandate an increase in oil production from oil shale, and require a reconstruction of the applicable plants. The production of household gas from oil shale will stop, however, because it is economically unprofitable and the plants are outdated.

In the use of oil shale oil our oil shale chemists differ in their view from the experts of many other countries. In the United States and elsewhere there are plans to transform raw oil shale oil by hydrogenation into a petroleum-like compound that can be processed according to the customs of petroleum processing plants. Our design is primarily directed to improve oil shale oil so that it can be used in the chemical industry. This direction has become fully justified in the last 15-20 years and has transformed the previously uneconomical branch of industry into a profitable one. Oil shale oil is currently being used, and will continue to be used, to provide useful phenols, tanning substances, epoxy glues, immersion oil, electrode carbon, etc. However, we cannot abandon the use of oil shale oil for heating, since many heating plants require oil that flows smoothly in the winter and does not jell at low temperatures. Oil shale oil meets these requirements and its use in northern regions is unavoidable. Although oil shale oil has been fairly thoroughly investigated, not all of the questions associated with its use have been answered and must be dealt with in the course of the comprehensive program.

The oil shale industry is located in North-East Estonia in a relatively small area. One of its characteristics is the fact that it is bordered in the north by the Baltic Sea and in the south by Lake Peipsi, the largest sweet water body in our area. The specifics of the location of the oil shale industry require that we pay particular attention to problems of ecology. The problem of mining residue and ash was discussed above, but the condition of water and the atmosphere is just as important. First off a completely reliable and constantly working system to monitor the environmental conditions must be established, and on its basis possible deviations can be noted and necessary countermeasures taken. It would be a mistake to think that such a system has been lacking up to now. It exists, but the analytical methods must be improved to obtain greater accuracy and speed. The oil shale processing enterprises and the leadership of Kohtla-Järve Rayon have done much to

improve the environment, but the establishment of new mines, plants, and single devices requires a comprehensive analysis from economic, technical, and ecological standpoints.

The comprehensive program for oil shale use has been designed to solve these and other above-mentioned problems; the program has the power of a law, and all interested agencies and enterprises take part in its fulfillment.

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GENERAL

KAZAKH ENERGY MINISTER INTERVIEWED

Tselinograd FREUNDSCHAFT in German 8 May 82 p 2

/Interview with Boris Ivanov, Kazakh SSR minister for energy and electrification/

/Text/ The state plan for the economic and social development of the USSR in the Eleventh Five-Year Plan period provides for the production of electric energy to be raised to 1,555 billion kilowatt hours by 1985. Boris Ivanov, minister for energy and electrification of the republic, talks about the Kazakh SSR's contribution to the development of electric energy in the country.

Kazakhstan's energy system was actually created in the era of the Soviet power. Its origin is linked to Lenin's GOELRO plan. The first product of Kazakhstan's energy industry--the Kharius hydroelectric power plant with a capacity of 3,000 kilowatt--is 53 years old. Currently the capacity of all power plants in the republic is around 14 million kilowatt. The largest plants are the Yermak grid power plant in the north of Kazakhstan with a capacity of 2.4 million kilowatt, and the Dzhambul grid power plant in the south with a capacity of 1,230,000 kilowatt.

Ten energy systems operate in the Kazakh SSR, combining 38 thermal power plants and 28 hydroelectric power plants. An intricate transmission network has been established. In the Tenth Five-Year Plan period alone some 8,500 km of electricity circuits of various voltages were taken into service. All rayon centers, grain depots, kolkhozes and sovkhoses are connected to the primary circuits. Going by the energy consumption of agriculture, Kazakhstan takes sixth place in the country.

/Question/ We are all aware that the major part of electric energy is produced by thermal power plants. Why is that?

/Answer/ That is due mainly to the development of the coal deposits at Ekibastuz, in Pavlodarskaya Oblast. Here a giant fuel and energy complex has been established, and it already produces more than 70 million tons of coal per annum. The coal is produced by strip mining with the use of stride excavators, and it costs a little more than R1 to produce a ton of coal--it is hoped in future to reduce the outlay to 40-50 kopecks. The hourly capacity of these machinery sets amounts to 1,000, 3,000 and 5,000 tons respectively, equal to the daily output of a medium coal mine.

In the foreseeable future the Ekibastuz deposits are to supply several thermal power plants with a total capacity of 20 million kilowatt. Their outstanding efficiency will be ensured by the minimum costs involved in transporting the fuel, the rapid assembly-line procedures in the construction of the plants and the uniform administration of the energy projects as well as centralized technical maintenance.

The cheap electric energy of the Ekibastuz cascade of grid power plants is to be supplied to western Siberia, the Urals and the European region of the country.

To this end unique high and highest voltage lines with a total length of 7,730 km are being constructed, including the direct current lines Ekibastuz-center with 1,500 kilovolt.

/Question/ How is hydro electricity developing?

/Answer/ Kazakhstan is rich in water resources, but they are mainly concentrated in the southeastern regions bordering on the Altai and Tianshan mountains. Here three major hydroelectric power plants have been constructed: The Bukhtarma and Ust-Kamenogorsk power plant on the Irtysh and the Kapchagai power plant on the Ili with capacities of 675,000, 322,000 and 434,000 kilowatt respectively.

The future prospects for hydroelectric power are linked to the construction of the Shulba hydroelectric power plant in eastern Kazakhstan, in the vicinity of Semipalatinsk. The new power plant with a capacity of 1.35 million kilowatt will be the third element in the hydroelectric energy cascade on the Irtysh. Together with the Bukhtarma and Ust-Kamenogorsk hydroelectric power plants, the Shulba power plant will significantly increase the region's energy potential. Its dam will supply a reservoir that has a capacity of 7.1 billion cubic meters. This will offer an opportunity for encouraging the development of irrigated cultivation in the northeast of the republic and improve the water supply for cities and villages.

/Question/ Nevertheless the rapid development of electric energy production does not remove the need for conservation...

/Answer/ At the present time conservation is one of our most important concerns. Judge for yourself: In the Eleventh Five-Year Plan period Kazakhstan's electric energy production is to achieve 90-95 billion kilowatt hours. In these circumstances a saving of just 1 percent will amount to 900 million kilowatt hours. That is enough to meet the energy needs of households in a city of 3 million residents. In the course of the five-year plan period Kazakhstan must ensure a 6 percent reduction in energy consumption. This equals the annual output of three power plants like the one at Kapchagai.

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GENERAL

## SHEVCHENKO BREEDER REACTOR BASIS OF KAZAKH REGIONAL DEVELOPMENT

Alma-Ata SOTSIALISTIK QUAZAQSTAN in Kazakh 6 Jan 82 p 2

[Article by S. Bayzhanov, Z. Saqiev and S. Khaydarov: "Majestic Human Conception"]

[Text] The Shevchenko nuclear power station is famous throughout the entire world. A schema of its BH-350 fast neutron reactor was shown 15 to 16 years ago at atomic energy conferences in Geneva, Detroit and London, and scientists from many lands were astonished and amazed at this advance of Soviet physicists.

To see this reactor, we put on white overalls and a hardhat and went up an elevator to the reactor control room. All around us, filling a long room, were automatic devices, and complex cybernetic-dosimetric mathematical and programmatic instruments. Serving each were three to four regular technicians and operators. All were specialists and engineer-scientists in nuclear physics. Through the fleeting, sparkling and blinking electron eyes of the indicators in front of them, they watch the heart beat of the reactor, monitoring every action of the peaceful atom and learning quietly about every activity in a world unseen by man. Everything is hustle and bustle. Numerous lights come on, dials of equipment move; some figures register, others disappear. Some of the technicians and engineers standing by quietly press red, green, white and black buttons before them, look quickly at computer screens and communicate with their equipment. This is the universal language of the atomic age, technical jargon incomprehensible to the average person. Calculations are communicated through mathematical means, algorithmic, ultra-beam impulse signals.

As the reactor director led us to the machinery room from the control room, we heard a great sound like the roaring of a distant river that got louder as we approached. The room was large and high ceilinged. Giant machines boomed; fat, branching conduits covered with stainless steel were a mass of shining metal. Farther on were thousands of unfamiliar machines. According to the specialists, the steel-covered neutron reactor, the moving force and power of all, can be found in a special deep shaft in the earth surrounded by many layers of carefully arranged high tensile, radioactivity-proof metal surrounded by reinforced concrete.

It is generally realized that atomic energy arises from the disintegration of nuclei into neutrons and protons caused by fast neutrons from one nucleus that collide with another. That is a conventional nuclear reaction. The fuel that brings about and enhances such a reaction in a special nuclear reactor is uranium-238, a useful uranium isotope. When burned as atomic fuel in the Shevchenko fast neutron reactor, it becomes plutonium-239, the most powerful atomic fuel. What is marvellous is that as the plutonium is consumed, it increases and grows in amount, and an enormous resource of atomic energy is accumulated at the nuclear plant. Thus the fast reactor is a complex energy combine producing nuclear fuel. When the uranium is consumed in the reactor in a chain reaction of this type, 1 kilogram of uranium-238 yields the energy produced from burning 2.5 million kilograms of the best coal. In general, production of energy by nuclear means is a million times greater than that produced by chemical energy. Thus, as the demand for per capita energy consumption grows and as the natural sources of organic fuel in the world decrease, all sectors will switch to atomic energy.

According to the estimates of scientists who have carefully calculated and investigated the development of the world energy base, oil products and natural gas reserves will last 30 to 40 years at present levels of annual consumption and coal reserves 200 to 500 years. Under these conditions many can only hope to be freed from energy shortages when the amount of atomic energy has been increased in the world through a process whereby atomic fuel is continually reproduced in fast neutron reactors.

Half a century ago, the first small atomic electric station that was built in the Soviet Union paved the way for the future of atomic energy. Since then thermo-electrical stations using nuclear energy as power have considerably advanced beyond engineering and technical levels achieved over a century. The 254 nuclear stations with a total capacity of more than 140,000 megawatts operating in 22 countries of the world in early 1981 produced 7 percent of the world's energy. Nuclear energy production will grow 10-fold by the beginning of the next century. This shows the future and the major advances that have been achieved by nuclear energy. But there are still many problems to be resolved. Current scientific goals are: a controlled thermo-nuclear reaction, a thermo-nuclear electrical station, magneto-hydrodynamic generators, new processes for extracting energy by fissioning the nuclei of heavy elements, a new method for synthesizing light elements.

One may catch a glimpse in the Shevchenko nuclear power station of the brilliant successes, in global terms, that await man in the development of nuclear energy.

As the nuclei of the uranium-238 atoms are consumed with neutrons in the active section of the fast reactor and as the wild energy produced from a vast, continuous chain reaction gushes forth in confusion, the wild, powerful atoms jump about, seethe madly, blaze and turn the giant generators and powerful turbines of the nuclear power station. Their energy is transmitted through electrical transmission lines reaching out to every part of the peninsula to become a humming power stream. Not only Shevchenko but the new cities and settlements, villages, developing factories and large industries,

construction projects, all the industries and all the inhabited territories that have suddenly come into being in the entire peninsula in recent years, are provided with power. This is the power of the peaceful atom which has begun to aid man greatly by opening miraculous mineral sources in a riverless land, issuing a river of oil and gas and providing a happy light to a region.

Specialists told us that everything possible has been done technically to reduce the radiation danger in building the Shevchenko nuclear station. In general, nuclear stations do not pollute the waters and atmosphere. Oxygen is not used to burn their fuels. For this reason nuclear power stations are far more productive from an economic and ecological point of view than thermo-electrical stations. Good examples illustrating this fact are provided in the recent book "Nuclear Energy" by Academician A. Petrosyants, chairman of the USSR State Committee for Utilization of Atomic Energy.

It was pointed out in the historical resolutions of the 26th CPSU Congress that the growth in electrical energy production in the 11th Five Year-Plan will be achieved based primarily through utilizing atomic fuel, hydro-electrical power and, in the eastern rayon of the USSR, coal. The amount of electrical energy produced in nuclear power stations will reach 220 to 225 billion kilowatt hours by 1985. Efforts to master fast neutron reactors and utilize nuclear fuel to produce thermal energy (as 24 to 25 million kilowatt hours of new capacity are put to work in electrical stations), efforts to construct a foundation for thermo-nuclear energy while investigating the structure of matter and of atomic nuclei and efforts to refine methods for producing and transmitting energy are also being continued. All of these things are directly related to the work of Manghyshlak scientists.

In order to fulfill the goal of increasing productivity in accordance with congress resolutions, the neutron-physical characteristics of atomic reactors, the structure of construction materials and new atomic fuel compositions are being investigated carefully. As a result, many reactor systems are being refined, some technical equipment is being renovated and the capacity of reactors is being much increased. The scope of introducing automatic equipment and automatic control mechanisms into production and of refining technological process is considerable. Within 10 years, high tension lines will completely supply energy to Zhangozen and Buzaci regions, where new reserves of oil and gas have been discovered. What is being done to bring this about?

"At present per capita supplies of electrical energy in Mangyshlaksкая Oblast are two times greater than the republic average," said D. C. Yurchenko, Director of the Manghyshlak Energy Combine. "The rapid pace of industrial development, development of the petroleum industry in particular, demands increased production of energy. The turbogenerators of No 3 Thermo-electrical Center (TETs-3) and construction of a new steam generator have been completed. During 1982 the first section of the center will be completed and the first energy bloc put into operation. In addition the No 2 Energy Bloc of the thermo-electrical center and the boilers of No 1 Thermo-Electrical Center, three condensers producing 2,000 tons of distilled

water an hour and three stations producing drinking water will be put into operation.

The machinery room of the fast neutron reactor is the vibrating heart of the nuclear power station, the great energy base that supplies a great region and an entire territorial-production complex with all the electricity, heat and drinking water that it needs. When you look at such a room, you will gain some idea of what has been achieved in nuclear energy and involuntarily recall the historical fate of the Kazakh people, which has achieved such incredible successes today and has risen to such heights in its wonderful socialist way of life. What were we before the Great October Socialist Revolution? Forgetting everything else, let us recall for a moment the needy way of life of the tattered, dirty, beggarly, "miserable Kazakh" as pictured by the great Ukrainian poet T. G. Shevchenko who came to Kazakhstan before the revolution. Isn't this exactly the picture of the life led by the Kazakh masses in a miserable, poor, ignorance-rife region on the shores of the Caspian during the Czarist period.

As a result of the great care of the communist party, we have been permanently freed from want and poverty. The unseen atom has been split, and this great achievement of the 20th century has given birth to a new dawn as a great support for the creative Soviet man, our contemporaries who understand the universal language of nuclear energy.

Specialists of the Manghyshlak Energy Combine showed us a book in which distinguished foreign visitors to the Shevchenko nuclear power station wrote their impressions. In the book were the entries of many of the most famous atomic scientists and technicians of the world.

"Since I became an engineer, I have been amazed at what you have been able to achieve in a short time," wrote American cosmonaut William A. Anders, member of the United States Atomic Energy Commission. "I am working with you in sodium-cooled fast neutron breeder reactors and in mutual assistance of our two great countries for their own good and for mankind's good."

An English scientist wrote: "The scope of the BH-350 reactor that plays such a great role in providing the region of Shevchenko City and the city itself with fresh water is extremely great." Scientists of the Federal Republic of Germany and France were also amazed at Kazakh achievements.

A vast gray plain. A brown steppe, the surface eroded, baked and hardened by the sun. Piercing wind and blowing sand.

Electrical energy, the light of life, the direction, blood and soul of modern industry and existence, has been given to this difficult, remote region, formed by a severe nature. And where is the power that produced this energy and floods of fresh water for the good of the people? And what kind of a power is it? We should think about this for a moment. This power is the majestic mind of man that has revealed the secrets of nature and mastered its universal language. This power, the majestic mind of man, has created this our golden age for the good of the people, the benefit of the Soviet fatherland.

## GENERAL

### ROUND-TABLE DISCUSSION ON ENERGY USE

Tallinn RAHVA HAAL in Estonian 24 Mar 82 pp 2-3

[Article compiled by Toomas Tallo: "How Do We Use Energy?"]

[Text] The ability to use all productive resources conservatively and effectively is becoming more and more important in economic policy. At the 26th CPSU Congress it was stressed that future development of the national economy would depend increasingly on a skillful and effective use of all supplies. The ability to put the national economy on a path of intensive development is based on rational use of existing productive capacity. For this reason strict conservation of all kinds of supplies is needed. Such tasks were given concrete form in the CPSU Central Committee and the USSR Council of Ministers directive "On the intensification of work in the fields of conservation and rational usage of raw materials, fuel, energy, and other material resources."

The economical use of electrical and thermal energy and fuel is most important. What is being done in our republic to achieve rational use of fuel and energy? What are the most pressing tasks in this field, what problems are awaiting solutions? These questions were discussed at a RAHVA HAAL round-table. Participants included Jakov Gorelik, director of the State Control Administration, ESSRO PROCUREMENT COMMITTEE, Eino Joost, director of the heavy industry section of the ESSR Gosplan, Enn Kallikorm, director of Estonian Energy Inspection, inspector Juri Melnikov of the ESSR People's Control Committee, Ants Pilving, deputy chief of the Industry Department of the ECP, and chief energist Jaan Viik of the Capital Construction and Electrification Administration of the ESSR Ministry of Agriculture.

#### Exact Accounting and Control Are Prerequisites for Rational Usage

A Pilving: The efficiency of production largely depends on usage of energy resources, and recently we have had some success in this field. For example, during the last 5-year period the volume of industrial production in our republic rose twice as fast as use of electrical and thermal energy. In the last year we met successfully our socialist obligations in conservation--the ESSR national economy saved 129 million kWh of electricity (vs. an obligation of 90 million kWh), 125,000 tons of solid and liquid fuel (121,000 tons) and 354,000 g/cal of thermal energy (260,000 g/cal).

But we have not yet achieved a decisive breakthrough in making the resource use more economical. Thermal and electrical energy usage have even increased in

the manufacture of some goods; some production collectives have not met the conservation goals.

J. Gorelik: Economical energy and fuel use in industry is judged according to two parameters--first, we calculate savings achieved by reduction of the average energy allocation for the production of an item, and second, there is the supplemental savings achieved by using less energy and fuel than the allocation. To evaluate conservation we need first of all a good data base--without it talk of savings will remain abstract. We need concrete resource savings. Usage norms must be realistic, optimal, and progressive, i.e., they must stimulate a search for ways to save, but at the same time they should be achievable by efficient production management. Audits of energy use indicate, however, that often large supplemental savings have been achieved thanks to unreasonable allocations.

Ministries and other agencies, and all supervisory organs must present their enterprises each year with goals to reduce the average monthly energy use, and supervise how the goals are being met. This is not always being done. For example, last year the Tartu Instrument factory was asked to reduce its average monthly energy use by 4.2 percent, but actually increased usage by 2.9 percent. A "supplemental savings" of 5.2 percent was realized in comparison with this increased usage. And, unfortunately, this is not at all exceptional. Last year the following firms increased (contrary to goals) their monthly electricity or thermal energy use norm, and thus achieved a so-called paper reduction: Estoplast, Estonian Fishing Industry, Voru Furniture Factory, and many other industrial enterprises in our republic. Last year the goals for reduced allocation norms were not met by the ESSR Food Industry, the ESSR Forest and Forest Products Industry, and the ESSR Meat and Dairy Industry ministries.

Some ministries and agencies are assigning monthly allocation reduction goals without regard for realistic possibilities and conditions. When the task is considered unrealistic, efforts are not made to meet it. On the other hand, control over goal achievement remains weak, and there are no economic sanctions for failing to meet them. Conservation of energy resources is usually considered to be the "supplemental savings" which is sometimes achieved due to high monthly allocations. On the basis of this indicator savings, bonuses are paid.

A. Pilving: In the evaluation of the work of productive collectives, more attention must be paid to energy use per unit produced. Currently, there are still leveling tendencies and formalism in establishing allocations and conservation goals, as well as in evaluating results. There was talk of this at the 4th ECP plenum. The role of ministries and other agencies in establishing energy use norms must be increased, and scientific institutions must be called to participate in this effort.

J. Gorelik: At the 26th CPSU Congress and the November 1981 CPSU Central Committee plenum, it was stated that the usage norms of many materials, energy and fuel are higher here than in other developed countries. For this reason improvements in allocation and the optimizing of norms must be considered tasks of great importance for our national economy.

J. Melnikov: An exact accounting and control over usage is the precondition for economical management, but we still have great deficiencies in this area. Calculation of thermal energy use is especially poor; since there are not enough meters, production goals have not been met; the existing instruments are frequently out of order.

For energy use evaluation, technically justified norms are needed. In the majority of productive branches, however, statistical norms are used. All too often they are adjusted so that if excessive usage occurs, the norms are merely increased; and they are lowered when there are big savings. This is paper adjustment that is not based on an analysis of consumption.

J. Viik: True, consumption norms are developed basically from statistical data, but we do not have many other opportunities--there are insufficient measuring devices. Thus, we are forced to use indirect data in establishing consumption norms for a majority of production processes, i.e., we have to use the total use of fuel or electricity, something that can actually be measured with specific devices. To establish technically justified norms, we need many self-recorders and other complex automatic devices. Procurement organs should more actively explore ways of obtaining such technical means.

E. Kallikorm: There is, however, also the fact that existing means are not fully used. Measuring devices are in short supply, but most enterprises have, say, electrical meters. In some new production units there are more meters than can be read.

We must demand that existing meters be used to the maximum--then in many places energy calculation can be brought down to the level of individual complexes and jobs. In this field quite a lot has been accomplished, for example in the Kohtla-Jarve Oil Shale Chemistry Production Collective, and in the Estonian Oil Shale collective. In these enterprises energy represents a rather large portion of production costs, and apparently this stimulates the search for ways to save. Many managers, however, have apparently no interest in automating energy calculations and processing these data, which would provide a survey of energy use by complex and job. The recent rise in energy tariffs should contribute to more precise consumption calculations and encourage conservation.

#### Use Less, and Use It More Efficiently

E. Joost: Perhaps the idea should be stressed that a call for conservation does not mean that less energy should be used, but that it should be used more rationally, effectively, and sensibly. For example, we will not attempt to save by reducing street lighting, but we do demand that the lights be turned off at the right time so as to avoid waste of energy.

J. Viik: Energy use norms may even be increased when it is justified by production efficiency. Production in agriculture is not yet completely electrified-mechanized, not to mention automated. We must bear in mind the need to reduce human labor in the production of every ton of meat and milk, but this requires increased energy use.

E. Kallikorm: Sometimes a worker's or an agency's poor work or inefficiency is explained away or justified by a need to conserve energy. This compromises conservation policy.

For example, let's consider the voltage limits that regulate electricity use at peak periods. They are needed so that the load imposed by all devices in the net will not exceed the power that generating stations can provide--ignoring this requirement would have downright catastrophic results for the national economy. For this reason there are rather harsh sanctions for exceeding the limits. But the policy of energy limits is not as rigid as sometimes claimed. The imposition and redistribution of limits are quite flexible. If correctives have to be made in a production segment; however, the request must be made in due time so that the collective not get into a difficulty.

Mistakes are also made where consumption is "regulated" by, say, turning off ventilation systems. Conservation must never be gained at the expense of the people's health and comfort, but rather through better, more effective arrangements and improved management.

E. Joost: It would be effective to transfer electrical energy usage to night hours when the general load is small. For this heat storage devices, etc. can be used. Quite a bit has been done in this area in our republic's agriculture, but there are still many unused reserves in other branches of production and in communal enterprises.

Use the Reserves!

A. Pilving: The main reserve of efficient energy use lies in the application of modern techniques and technology. This accounts for about 70 percent of the energy savings in industry. Wherever these reserves have been used, there the conservation achievements have been best. For example, in the Tallinn Machine Factory imeni J. Lauristin, electrical energy consumption during the 10th Five-Year Plan was reduced by 600,000 kWh, and last year consumption practically did not increase, although the volume of production steadily increased. The ministries and other agencies must assure that the plans of the enterprises for new techniques pay sufficient attention for application of energy-conservation technologies and techniques.

J. Viik: In agriculture we could reduce liquid fuel consumption in drying grass and grain by up to 30 percent if we could regulate the amount of heat required in the technological process by adjusting fuel use in the boilers. But we are lacking the necessary atomizers--once their production can be organized a large reserve for conservation can be applied.

J. Melnikov: There are reserves also in the simple curbing of waste and more economical management. For example, an inspection of the Polva Flax Factory revealed that each year large amounts of flax stems are destroyed; if they were burned in the boiler about 300 tons of kerosene could be saved. In the Standard Collective much condensed water was drained into the sewers, but its recycling into the heating system could have resulted in savings of some 500 kg of heating oil annually. Generally, many enterprises still waste heat by emptying condensed water into the sewers, even though this could be easily avoided.

J. Gorelik: Some managers attempt to hide their reserves and avoid energy consumption calculations. For example, we recently inspected the Estonian Fish Industry Production collective. We found that they use electricity from docked ships for their on-shore enterprises--because ship energy is not counted. Whenever energy needs increase, orders are given to the ships to start their generators. Lack of inspection causes waste. People's control groups must take decisive steps to combat such phenomena.

J. Melnikov: Energy use is a subject of constant attention for people's control groups, but like everything else, the work of the people's control organs could be more efficient and their work better organized. For example, we cannot deem it right that in some enterprises, the energy resource consumption sector of the people's control group is headed by the chief power engineer--it would be better that this job be held by a worker whose job is not so directly related to the task at hand.

In enterprises, conservation is to be implemented in all productive units by every worker. Currently the enterprises' power workers have an overview of energy consumption, but department heads often do not know how much energy their production consumes.

E. Kallikorm: In spite of the difficulties, deficiencies and unsolved problems, we can still state that recently there has been a certain shift in energy use. In plant inspections we only seldom see obvious waste (unneeded lighting, a machine running in neutral, etc.). This should be taken as a measure of success of conservation propaganda.

Now this propaganda has to be taken to a new level. Now we no longer need the appeal "save energy," as much as specific advice on how to save.

E. Joost: The propagation of such knowledge is at the same time education. And this is necessary in every stage of life. Currently most of the attention in energy conservation has been focused on the production sphere. But the communal enterprises have been inspected much less, and for this reason there are also large unapplied reserves here. I think that we should pay more attention to educating people and to propagating conservation knowledge in the population.

#### Improved Conservation Planning

E. Kallikorm: There is the general impression that it is more possible to conserve in industry where the organization of production is at a high level and mechanization and automation more advanced. While this is generally true, we should appreciate all the more the work done in our republic's agriculture in monitoring energy use. We can say that currently agriculture is participating equally with industry in conservation activity. This is very important if we remember that more than one-fifth of the energy used in our republic is consumed in agriculture.

J. Viik: In 1979 we began to plan for energy conservation comprehensively within the Ministry of Agriculture. We implemented a general directive for conservation and reporting. Last year the farms saved 36.1 million kWh of electricity by using various technical resources. There is a competition for the best conservation suggestion, and the more effective simple conservation techniques are disseminated by a bulletin.

A long-term contract has been concluded with the Estonian Agricultural Academy for research which will form the basis for energy use allocation. Last year we already received energy consumption reports from some farms and warehouses, and on their basis more or less exact norms can be developed.

We perceive great reserves in the automation of production supervision. But at present we lack the necessary technical means to apply such systems or to establish a data base for energy use. We have developed and designed several means for automated processing, hoping to arrange for their production in the Harju KEK. Once this question is solved, we hope to assist some of the industrial enterprises of our republic with these devices.

E. Kallikorm: Currently a comprehensive long-term plan for energy conservation is in the development phase; it will outline the specific tasks of all agencies and enterprises in this area until 1990. It will outline the means to improve technology and the techniques to reduce energy consumption in production. It will provide the necessary means for their application. Soon the program council will survey the plans and suggestions of enterprises and ministries, which will form the basis for a comprehensive plan for all the productive spheres of the republic.

The plan includes the idea of processing energy consumption data from the entire republic uniformly by computer. Our aim will be to establish technically justified consumption norms for every branch of production and every enterprise. This is a large and complicated task, but in spite of all the difficulties and unsolved problems mentioned above, we must begin to solve that task even now, so as to meet the demands of the future.

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## GENERAL

### PROGRESS, PROBLEMS IN DEVELOPING MANGYSHLAK PRODUCTION COMPLEX TOLD

#### New Approach Required

Moscow PROMYSHLENNOYE STROITEL'STVO in Russian No 3, Mar 82 pp 23

[Text] "It is apparent that it is necessary to approach the extracting industries as a whole in a new way. They now get the lion's share of capital investment, and, indeed, the demand for raw and energy-bearing materials will grow. Consequently, the successes of the whole national economy will depend greatly upon a rise in the effectiveness of the extracting industries. The ways to do this are to accelerate scientific and technical progress, to process useful minerals intensively and in integrated fashion, and to make wider use of secondary resources."--L. I. Brezhnev. The Accountability Report of the CPSU Central Committee to the 26th Party Congress.

Regional production complexes, which are a highly effective combination of several branches of industry that have precise production and technological interrelationships and make the best use of raw materials, energy and transport nets and infrastructure are now increasingly a decisive factor in the social and economic character of many important parts of our country. Regional production complexes are acquiring special importance in the accelerated development of the eastern and northern parts of the country that possess great raw-material reserves.

As N. A. Tikhonov, Chairman of the USSR Council of Ministers, noted in his report to the 26th CPSU Congress, the 11th Five-Year Plan will be the first step in realization of the USSR's power-engineering program, which is being developed at the initiative of Leonid Il'ich Brezhnev. Major complicated tasks are to be performed under the new five-year plan by oil, gas and coal industry workers. Work will continue on improvement of the distribution of productive forces, both in existing regions and in new ones. It is planned to intensify their integrated development and specialization and to take steps toward rational economic interrelationships.

A number of regional production complexes, including the one at Mangyshlak, will be developed in the country's eastern and northern regions. The TPK's [regional production complexes] created during the Ninth Five-Year Plan have supplied all the nationwide growth in the extraction of oil, gas and coal. The journal has already acquainted readers, in issue No 4, 1981, with the problems of developing the Pavlodar-Ekibastuz TPK, the basis of which is the Ekibastuz fuel-and-power complex.

As Comrade L. I. Brezhnev noted in the Accountability Report to the 26th CPSU Congress, the Mangyshlak Regional Production Complex will play a growing role, along with other TPK's, in the economics of the Asian part of the country.

The 26th CPSU Congress decided that development of Kazakhstan's petrochemical industry, which has increased primary oil refining 2.1-fold, is to continue, simultaneously with other branches of industry there, that geological exploration for oil and gas in West Kazakhstan will be expanded, and that development of the Buza-chi Peninsula oilfields will be speeded up.

D. A. Kunayev, member of the CPSU Central Committee Politburo, First Secretary of the Kazakhstan Communist Party Central Committee and Thrice Hero of Socialist Labor, noted in his book, "Sovetskiy Kazakhstan," the important role of the oil industry in development of the republic's economy. He stresses that conquest of the natural riches of the Mangyshlak Peninsula has made the republic one of the oil-bearing regions of the Soviet Union and that creation of the Mangyshlak TPK, where gas processing, the chemical industry, power engineering (including nuclear) and other branches of industry are being developed successfully, has led to a burgeoning growth in the district's economic potential. And all this has been achieved under the exceptionally difficult environment of an uninhabited, waterless steppe.

The collection of articles published below discusses the set of party and economic measures for developing the Mangyshlak TPK, the successes achieved, and the urgent tasks of the 11th Five-Year Plan that the collectives of builders, operators and party and economic organizations face.

#### Party Contributions Told

Moscow PROMYSHLENNOYE STROITEL'STVO in Russian No 3, Mar 82 pp 23-25

[Article by V. G. Savchenko, secretary of the Mangyshlakskaaya Oblast Committee of the Communist Party of Kazakhstan: "The Accelerated Development of the Mangyshlak TPK [Fuel and Power Complex] Is a Most Important Concern of the Oblast's Party Organs"]

[Text] Comrade L. I. Brezhnev, in his report to the 26th CPSU Congress, called our regional production complex, the Mangyshlak, one of those complexes that are acquiring a growing role in the country's economy. This high-capacity regional production complex has been created in less than two decades on the vast lands of a semidesert that abuts the Caspian Sea. The example of Mangyshlak shows how intensively and on what a large scale the development of the new region's resources is changing basically the level of development, the structure of the productive forces, and the role of the region in the country's unified national economic complex.

In 1965 the first trainload of Mangyshlak crude was sent to the country's refineries. And already last year the 200-millionth ton of crude was recovered. At Mangyshlak, for the first time in world practice, the problem of desalinating sea water on a large scale was solved, the world's first industrial breeder reactor was started up and is operating reliably, and a unique "hot" oil pipeline for transporting high-paraffin crude to the Central Economic Region has been laid. The attractive city of Shevchenko has been built on the Caspian shore, and modern cities and settlements have grown up and highways and electric-power lines have been laid in a previously uninhabited district.

Today, in the nationwide division of labor, the Mangyshlak regional production complex is represented primarily by the oil-recovery, gas, chemical and fishing branches of industry and the building-materials industry. And regionally, its composition includes all enterprises and organizations located in our oblast.

The oil industry has become the core of the regional production complex, which unites its production elements into a unified whole. Each year the complex recovers more than 16 million tons of oil and 3.4 billion cubic meters of natural and casing-head gas.

Qualitative changes have occurred during the 10th Five-Year Plan in the TPK's specialization. Along with the outstripping development of the oil and gas recovery and gas-refining industries, a new branch has appeared--the chemical industry. All the Shevchenko Plastics Plant's operating capacity has been put into operation; after it is mastered, it will be one of the largest plants in Europe. Enterprises of branches of industry that are of servicing significance--electric power, the repair and the subsidiary building-materials industries, the food industry, light industry, transport and communications--have been developed.

Mangyshlak, during all stages of its formation and development, has constantly felt the attention and concern of the party and the state. Further dynamic development of the region is called for in 26th CPSU Congress decisions. This inspires the communists and all the oblast's workers, it is a powerful stimulus for shockwork, and it spurs self-discipline, responsibility and high self-sacrifice.

In view of the intensive development of the oblast's economy and the appearance of new production facilities, the establishment of stable, close-knit work collectives and the creation within them of a good moral and psychological climate and of the requisites for fruitful work are of paramount importance to us. While carrying out 26th CPSU Congress decisions, the oblast party organization is being enriched by new experience in organizational and educational work and in supervising the buildup of the economy.

At the most important facilities, where numerous collectives of diverse subordination are working, the creation of councils of the secretaries of party organizations is practiced, as is the conduct of joint party meetings of interdependent enterprises. A system of political information for workers has taken shape and is operating, and talks by supervisory workers at unified political-education day programs and by informational and propagandist groups in the working collectives and at housing have become regular. All this promotes the successful solution of economic tasks.

In carrying out the decisions of the 26th CPSU Congress and the 15th Kazakhstan Communist Party Congress, the oblast's workers have achieved new successes in development of the Mangyshlak regional production complex and in the execution of plans for the first year of the 11th Five-Year Plan. The annual plan for industrial output realization was met ahead of time (28 December), the volume of production of commodity output rose by 19.6 percent in comparison with 1980, and the goal for labor productivity growth was surpassed. All important facilities due for early startup were turned over for operation by the builders. Goals for turnover to the state of all types of livestock output were overfulfilled. Much has been done to satisfy completely the workers' social, cultural and personal-amenity requirements, and, as in preceding years, the plan for housing construction was fulfilled.

During the current five-year plan, tasks that are more complicated and larger in scale than formerly face the oblast's party organizations and all workers' collectives. The oblast party organization is working persistently to accelerate development of the Buzachi Peninsula oilfields and to bring oil recovery here up to 5-6 million tons by the end of the five-year plan. Simultaneously, a set of measures is to be accomplished for maintaining a high level of recovery at the "old" fields of Uzen' and Zhetybay.

It was pointed out at the 26th Party Congress how enormous are the possibilities for increasing oil recovery that are to be found by increasing oil-formation productivity. Almost all the known methods for increasing the amount of oil recovery known to world practice are being used at Mangyshlak, but their effectiveness still is not adequate. The creative efforts of production workers and scientific organizations have been mobilized for the solution of this problem.

Party committees are guiding the communists and all oil-enterprise workers in the improvement of well-drilling technology, where we are having many difficulties. Drilling is the most capital-intensive production activity, expenditures on which comprise almost half of the capital investment specified for developing the oil industry. A large part of it goes to plugging cement, chemical reactants and weighting materials that we import from thousands of kilometers away. The goal is to reduce these expenditures through the economical and efficient use of material resources. At the same time, one of the ways is to develop local deposits, which make available substantial reserves of barite-containing ores and palygorskite clays.

It is planned that the oblast's recovery of oil and gas condensate will reach 18 million tons in 1985. All the growth will be obtained through the accelerated development of the new fields on the Buzachi Peninsula.

During the current five-year plan, Mangyshlakneft' Association drillers are to drill 3,900 development wells, or about double the number of the 10th Five-Year Plan. High goals have been set for the oilfield workers for 1982: they are to recover more than 16.5 million tons of oil and gas condensate--almost 1 million tons more than in 1980. Natural and casing-head gas recovery will be 3.3 billion m<sup>3</sup>. It is necessary to drill through 900,000 meters of rock and to construct more than 500 developmental and explorational holes.

Such large tasks require an intensification of organizing work by party committees and an improvement in methods for party monitoring of fulfillment of the planned tasks. We realize that success of the matter will depend greatly upon political support of the economic decisions. In speaking about work on the buildup of oil-field facilities, drilling and the introduction into operation of new wells, the wide introduction of progressive methods for increasing total withdrawal, the repair of wells and the conversion of wells to more effective methods of operation--in all questions, education about responsibility for the assigned task takes first priority in all questions for party organizations. Moreover, carrying out the assigned tasks depends not just on oilfield workers. Workers of other oblast enterprises and organizations--builders, power engineers and automotive transport workers--are involved in it to one degree or another. Insuring unity of action of these and other collectives in achieving the final goals also is of concern right now to the oblast party organization.

A major role in the integrated development of our district has been assigned to the Kazakh Gas Processing Plant. Along with insuring full utilization of casing-head gas, it is to provide raw material--ethane--to the plastics plant and to help get oil from the ground by the least expensive method--gaslift. Therefore, the party oblast committee attributes great importance to the activities of this collective. Thanks to the measures that were adopted in timely fashion during the rebuilding of the compressor department, the gas processing plant has gone to full production capacity for treating gas--1.5 billion m<sup>3</sup> per year. Measures are being taken to raise further the effectiveness of refining gas and to increase the extraction of the necessary components from it, and the execution of these measures has been taken under monitoring by party organizations.

Party work experience indicates that the replacement of managerial personnel while solving production questions does not in the long term yield stable, positive results. On the contrary, this practice engenders irresponsibility and dependency. That is why we persistently are implementing experimental forms of specific and daily party supervision of the development of the various industries and of the TPK as a whole.

Such forms of work as the creation of staffs for the coordination of party, political, organizational and economic work are becoming a practice of party committees. Those staffs that were created during development of the Buzachi Peninsula fields and construction of the Shevchenko Plastics Plant have justified themselves.

City and rayon party committees are strengthening the party nuclei of the worker collectives of enterprises that recover crude, and they are paying great attention to the correct assignment of communists to decisive production sections and to the reception into the party of workers of the leading vocations. Today one out of six crude-recovery operators and one out of five drillers are communists. Much is being done to develop the brigade form of organizing work, with evaluation in accordance with the final results of the collective's work.

One of the basic elements of the Mangyshlak TPK is agricultural production. Mangyshlak right now is producing the cheapest mutton in the republic and the greatest amounts of valuable camel's hair and high-quality karakul astrakhans. A substantial increase in the production of all types of livestock and a reduction of the prime cost thereof are hampered greatly by a weak feed base. The opinion has been inbred that Mangyshlak must import feed from other parts of the republic each year. We consider that we have the potential not to be parasites. The problem can be solved, using water of the North Aktau artesian basin for irrigation. Of course this is fraught with definite difficulties and capital costs, but indeed are we not spending substantial funds to ship hay thousands of kilometers?

Further development of the complex is governed primarily by the scale of capital construction. It goes without saying that everything that has been created and that is operating in the oblast was created in the first place by the builders' hands, and we have a right to be proud of them. At the same time, it cannot be said that the existing base for construction and construction-industry enterprises and the capacity thereof meet fully the ever-rising needs for developing the economy of the regional production complex. Because of this, it is necessary to create a high-capacity Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] installing and construction association on the basis of the existing Mangyshlakneftegazstroy [Mangyshlak Trust for the Construction of Oil and

Gas Industry Enterprises] and to greatly strengthen the construction organizations that are building in the countryside and are constructing facilities for housing and for social, cultural and personal-amenity purposes in the oblast center--the city of Shevchenko.

The problems of developing the Mangyshlak Regional Production Complex were discussed in detail at a practical-science conference that was held recently in the city of Shevchenko, where recommendations were made about the integrated use of the peninsula's riches and about directions for developing industry, transport and communications, and geological exploration and prospecting and for making social transformations. Much now depends upon the coordinated work and the step-by-step solution of the contemplated program by planning organs and the interested ministries and agencies.

"The Basic Directions," which were approved by the 26th CPSU Congress, specified: "Expand geological exploration for oil and gas in West Kazakhstan and speed up development of the oil fields on the Buzachi Peninsula." The oblast party organization is mobilizing the creative efforts of all worker collectives for the solution of these tasks and is supporting unconditional fulfillment of 11th Five-Year Plan tasks. The successes of the Mangyshlak workers that were achieved last year are a good base for fulfilling the tasks of the five-year plan as a whole.

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#### Future Needs

Moscow PROMYSHLENNOYE STROITEL'STVO in Russian No 3, Mar 82 pp 25-27

[Article by O. I. Zheltikov, First Deputy Chairman of Kazakh SSR Gosplan: "The Prospects for Forming and Developing the Mangyshlak Regional Production Complex"]

[Text] Given the modern scale of the national economy, an indispensable prerequisite to further development of it is a concentration of forces and resources on the decisive areas of economic development. A concentration of forces and resources to cope with major national, interindustry and regional problems makes regional production complexes (TPK's) possible. The country's regional economic structure right now is represented by a system of TPK's.

The Mangyshlak Regional Production Complex takes part in the national and republic division of labor, primarily with the oil-recovery, gas, chemical and fishing industries. Oil production has become the basic industry that determines the TPK's specialization. Each year the TPK recovers a substantial amount of oil and gas, 342,000 m<sup>3</sup> of coquina, 35,300 tons of fish, and so on.

In a relatively short period new oil fields on the Buzachi Peninsula, the Karazhanbas-Shevchenko oil pipeline, a plastics plant and many other facilities were built up and put into operation. Labor collectives were formed, and economic ties with other regions of the republic and the country were strengthened. Each year the cities of Shevchenko, Novyy Uzen' and Fort Shevchenko and the urban-type settlements of Yeraliyev, Zhetybay, Mangyshlak, Shetpe and Beyneu are becoming increasingly attractive.

Today, in scale of development, Mangyshlak is an industrial region of national significance.

Oilfield workers, geological explorers, builders, and workers of agriculture, transport and other branches of the national economy are waging a persistent struggle to raise the effectiveness of social production and the quality of output.

During the last five-year plan the oblast met ahead of time the goals for volume of realization of industrial output. It sold more than 300 million rubles' worth of output above the plan. The generation of electricity grew by almost 24 percent, and the recovery of gas condensate increased 6 percent. The output of repair and auxiliary enterprises and building-materials production increased, the fixed capital of sovkhozes rose by almost 60 million rubles, the availability of power to the countryside was raised, and agriculture's tractor and farm-machinery fleets were almost completely updated.

A substantial step was taken in the solution of social tasks. The average monthly wage for blue-collar and white-collar workers employed in the national economy rose. Capital construction was performed on a large scale. Hundreds of facilities for production, social and cultural purposes and 810,000 m<sup>2</sup> of total housing space were introduced into operation.

These successes were the result of major organizational and political work of the oblast, city and regional committees of the party and of primary party organizations, soviets of workers' deputies, economic managers, ministries and agencies, scientific institutions and design organizations.

Thanks to development of the natural riches of Mangyshlak, Kazakhstan is in second place among Union republics in oil recovery, and the complex itself has acquired a sharply delineated specialization. The better-known oil and gas fields are the Uzen', Zhetybay, Karazhanbas and Kalamkas.

The first capacity of the Shevchenko Plastics Plant, which became one of the largest in Europe after the completion of construction, has been put into operation within the TPK.

An important element of the complex is the Mangyshlak Power Combine, which supplies electricity to the whole peninsula, fresh water and process water to many cities and settlements, and heat to the city of Shevchenko and the Mangyshlak and Umirzak settlements.

Along with the leading branches that shape the complex, the branches of the production infrastructure that service the economy and the populace are being developed, as are the branches of the nonproductive (social) sphere that are called upon to satisfy the workers' cultural and personal-amenity needs. Among the branches that service production and accelerate the shaping of the TPK's economy are the repair enterprises.

In the concluding year of the 10th Five-Year Plan, the output of the TPK's auxiliary and repair enterprises was 10.5 million rubles. The group B industries are represented by the fishing, meal, milk, pastry and breadbaking industries, light industry, and local industry.

During the 10th Five-Year Plan the oblast's builders put new fixed capital into operation, large amounts of capital investment were assimilated, and hundreds of millions of rubles' worth of construction and installing work was done. The largest amount of construction work was performed at facilities for recovering, processing and transporting the output of the oil, gas and chemical industries and at facilities for social, cultural and personal-amenity purposes. Construction in the countryside is being pursued on a broad scale.

The broad economic ties of the complex's building-materials industry enterprises with other parts of the country are sharply reflected in development of the transport complex. Right now that complex is represented by rail, motor-vehicle, pipeline, maritime and air types of transport.

Road construction was performed under conditions of unprecedented difficulty. The complex's road network is more than 2,000 km long and more than half of it is hard-topped.

A ramified pipeline grid--the Uzen'-Beyneu-Gur'yev-Kuybyshev, Uzen'-Zhetybay-Shevchenko and Kalamkas-Karazhanbas-Shevchenko oil pipelines--has been created for delivering recovered oil to the places where it is refined, and the Central Asia-Central Economic Region gas pipeline has also been built. Pipeline transport is not fully loaded with oil and gas being pumped. Therefore, one of the strands of the Uzen'-Kuybyshev oil pipeline is now being used to deliver water from the Volga (in the Kuybyshev area) to Uzen'.

The 26th CPSU Congress pointed out ways for further developing regional production complexes, including Mangyshlak's. The congress's decisions stated: "Develop the oil-recovery industry in regions of West Siberia and the Kazakh SSR regions at a higher pace....Expand geological prospecting for oil and gas in West Kazakhstan and accelerate development of the oilfields on the Buzachi Peninsula." A major program for increasing oil recovery in West Kazakhstan has been planned in accordance with these instructions.

As is well known, the main growth in the republic's oil recovery that is envisioned is to be obtained by developing the new fields of the Buzachi Peninsula. No little has been done here, but much more remains to be done. In order to bring these fields up to the maximum level of recovery, it is necessary, in a short time, to drill several thousand meters of developmental and injection wells, to construct hundreds of facilities for gathering and transporting the crude, and to accelerate the testing of such methods for increasing the formation's productivity as steam-heating stimulation, the creation of a moving combustion front and modifications thereof, and displacement of the oil by micellar and polymer solutions. A large amount of work is also to be done to build up the facilities at the new oilfields.

In order to develop the complex successfully, urgent measures should be taken to insure normal operation of the plastics plant and the delivery thereto of adequate amounts of raw materials.

There are serious deficiencies also in the work of the rail, automotive and maritime transport complex. The railroaders still are not sending enough cars for loading. There are many flaws in the work of the Mangyshlak Operations Administration of Minavtotransport [Ministry of Motor Transport]. The vehicle fleet's utilization factor was very low last year, and productivity per rated tonnage was 59.4 percent. Maritime port operation is hampered by an inadequate number of pallets

for transporting coquina. The Ministry of Building-Materials Industry should solve this problem. In order to increase freight and passenger haulage by maritime routes, it obviously is necessary to design and build a new dock for loading crude and a new passenger facility at the city of Shevchenko.

There are also many unsolved problems in capital construction. In 1980 the plan for construction and installing work in the region was carried out by only 90.2 percent, for the introduction of fixed capital by 56.1 percent. Capital investment was assimilated by 93 percent.

Since 1978, the main technical and economic indicators for construction organizations have remained unchanged. There has been no appreciable increase in the introduction of capital, the assimilation of capital investment, and amounts of construction and installing work performed, or in the rise in labor productivity or growth of yield on capital or profit. One cannot be reconciled to such a situation.

Definite work has been done in the oblast to create a supply and equipment base for the branch. However, the capacity of the construction industries lags greatly behind the annually rising amounts of capital construction. For example, trusts that build agricultural and water-resources facilities do not have enterprises for production of the main mix of construction structure and articles and of building materials, or bases for equipment repair. Therefore, almost all the reinforced concrete and basic building materials must be imported from other oblasts in the republic.

Because of the TPK's shortage of housing and children's preschool institutions, a severe shortage of construction workers is being experienced, and this is being felt especially in the countryside. Such a situation has been created in Mangyshlaksel'stroy-12 [Mangyshlak Rural Construction Trust No 12]. And it is not accidental that it does not fulfill the construction-and-installing operations plan.

The rich Zhetybay deposit of coquina is on Mangyshlak. A production association for producing wall and facing materials made of coquina has been established and is operating on the basis of it. This material has been appraised highly by builders. Structures built of it are distinguished by longevity and attractiveness. Many specially built buildings in Moscow, Leningrad, Alma-Ata, Shevchenko and some other cities have been faced in varicolored slabs made of limestone coquina.

Work is being done to expand the Zhetybay quarry of the republic's Minpromstroymaterialov [Ministry of Building Materials Industry], which will be put into operation in 1982-1983 with a capacity of 120 million standard-equivalent units of brick of small dimensions, 36,600 m<sup>3</sup> of large facing blocks, and 50,000 m<sup>2</sup> of facing slab.

In 1980 Kazmezhkolkhozstroy [Kazakh SSR Interkolkkhhoz Construction Trust] turned over the first phase of the quarry at the Kzyl-Turan deposit with a capacity of 150 million standard-equivalent brick units of wall blocks made of coquina.

This valuable building material is being quarried by USSR Mintransstroy [Ministry of Transport Construction] and USSR Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises].

Development of the TPK raises a number of priority tasks, including that of providing the population with foodstuffs, including the task of studying the potential

for developing agriculture within the oblast. This concerns especially the production of food that is poorly transportable and is perishable--vegetables, milk and eggs.

The development of the TPK's production forces is inseparably connected with the water supply. Sources for supplying water to the populace, industry and agriculture are the batteries of distillers of the Mangyshlak Power Combine, the Kungrad-Beyneu-Makat water pipeline and the Beyneu-Novyy Uzen' branch, and underground water of the Tyuyesu, Sauskan, Samskoye, Severo-Aktauskiye, Baskudukskoye, Cape Peschanyy, Katyk, Vostochnyy and Zapadnyy Karatau and Kzylkum fields. For industrial purposes, water that comes over the Kuybyshev-Novyy Uzen' water pipeline is used, and Caspian water is used for waterflooding of oil formations. But already now, the water resources do not satisfy the complex's requirements, and this hampers further development of its productive forces.

Despite the limited amount of these resources, the uneconomical use of water is occurring: substantial amounts of Amudar'ya water are lost on the Kungrad-Beyneu section of the water pipeline, especially in the city of Novyy Uzen'. Because of the unsatisfactory state and poor capacity of the purification structures, waste water is not being used in adequate amounts. The Kungrad-Beyneu water pipeline does not operate at full capacity: instead of collecting 78,000 m<sup>3</sup> per day, as called for by the startup minimum for the first phase, only about 50,000 m<sup>3</sup> are collected from the Amudar'ya.

The TPK can be provided completely with water by using the water resources of neighboring water-supplying regions. The most realistic way to solve this problem in the long term is to transfer part of the discharge of the Volga, Amudar'ya and Ob' rivers, with minimal harm to their basins. In order to eliminate the water shortage, much can and must be done today. In particular: introduce the Kungrad-Beyneu water line at full design capacity to divert up to 137,000 m<sup>3</sup> of water per day from the Amudar'ya and to deliver 50,000 m<sup>3</sup> of it to the city of Novyy Uzen'; increase the capacity of the distilling installations at Shevchenko, putting additional batteries into operation; use more completely the underground water of the oilfields that are being developed; expand the capacity of the purification installations with a view to making repeat use of industrial and sewer water for industrial needs, for watering green plantings and for irrigation; and cease the discharge of polluted water into the sea.

Development of the TPK gives rise to a substantial growth of power consumption, because of which it is planned to erect the Mangyshlaksкая GRES. The first two units, of 210,000 kw capacity each, are to be introduced during this five-year plan, and a third such unit during the next plan period. Completion of construction of the station will enable the generation of electricity to be increased by 1,343 kw-hr over 1980.

For purposes of transmitting and distributing electricity, the further development of power transmission lines is needed. It is planned to add a second strand to the existing Shevchenko-Novyy Uzen' 220-kV LEP [power transmission line]. Doing so will enable the power supply for the gas-treatment plant and other enterprises to be improved. Also planned is the construction of a Novyy Uzen'-Bekdash power line. Lines of 110 and 35 kV also should be further developed.

With a view to making rational use of fossil fuel, it is desirable to develop power engineering, expanding the Shevchenskaya Nuclear-Power Station.

In order to raise the reliability of the power supply to customers over the long term, the construction of a Gur'yev-Beyneu-Shevchenko 500-kV LEP and the establishment of an intersystem of the Gur'yev power center with the Aktyubinskoye power centers and with the Astrakhan' 500-kV power transmission lines should be called for.

Rail haulage of freight will grow systematically. So thought must be given right now to increasing the mainline throughput by rebuilding two-way insertions and second-phase passing sidings.

Development of the region's productive forces is causing growth in automotive freight haulage, which, according to computations, will in 1985 exceed the 1980 level 1.3-fold. In so doing, the share of freight haulage by common-carrier motor transport will increase from 63 percent in 1980 to 83 percent in 1985. Simultaneously, the truck fleet will be increased, mainly with large-capacity vehicles. Because of this, the desirability of creating automotive repair enterprises here should be determined.

The high level of development of the TPK's material production requires the creation here of a whole complex of branches of the nonproduction infrastructure, which will insure a sufficiently steady growth in people's living conditions, thus also promoting the recruiting and the retention of labor resources. The approach to development of the services-sphere branch in an industrial region that is being developed rapidly meets precisely the requirements in this area that were advanced by the 26th CPSU Congress in the matter of raising the people's welfare.

Housing services can be included among the more developed of the nonproductive branches in the region. In the past decade the provisioning of well-appointed housing in Novyy Uzen', Shevchenko and other cities and workers' settlements of the region has improved greatly. At the same time, housing-construction plans are not being carried out, a situation that is completely intolerable.

Not everything has been done in the region to improve medical, personal-amenity, shopping, cultural and municipal services for the populace. Much remains to be done also to improve the use of labor resources. In particular, several thousand people of the oblast's unemployed can be involved fully in the economy. However, the overwhelming portion of them do not have the vocational education and have not been trained for work in industry. Therefore, the training and retraining of personnel primarily should be intensified. Special attention must be paid to the construction of children's preschool institutions, in order to involve women in the work force more widely. Moreover, the economic structure of the branch must be improved to take demographic factors into account.

In examining the process of establishing the Mangyshlak TPK, a lack of integration in development of the main branches that are shaping the economy calls attention to itself. As a matter of fact, the complex has at its disposal oil-recovery, gas-processing and chemical-industry enterprises, but it lacks some of the important connecting links--oil refining and petrochemicals, although the prerequisites for their development exist.

In his speech to the 26th CPSU Congress, Chairman of the Kazakh SSR Council of Ministers B. A. Ashimov emphasized: "Oil that is being recovered on the Buzachi Peninsula is unique in composition, but it is being refined in unintegrated fashion, only an insignificant portion of light petroleum product is being obtained

from it, and many components are leaving in firebox mazut. Because of this, it is believed that it is desirable to build in the city of Shevchenko enterprises for the intensive refining of Buzachi crude, using an extraction technology that includes a valuable metal--vanadium, and also a technology for obtaining raw materials to supply the large plastics plant has gone into operation here, thus enabling the country's polystyrene production to be almost doubled.

The question of using waste brine from distilling installations, especially in conjunction with the problem of assimilating the riches of Kara-Bogaz-Gola, is not without interest.

The Mangyshlak Regional Production Complex still has not been established with finality. As has already been noted, it lacks elements for oil refining and for producing final types of output, some auxiliary and service-type branches still are not adequately developed, and there are definite difficulties in creating and developing them. Many problems will be solved within the next few years. As CPSU Central Committee General Secretary and Chairman of the USSR Supreme Soviet Presidium Comrade L. I. Brezhnev pointed out: "The 11th Five-Year Plan should fully embody the party's economic policy and incorporate the latest achievements of economic, scientific and engineering thought and all our experience." There is no doubt that the ministries and agencies of our country and the republic will do everything possible for further development of the region.

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#### Remedial Measures

Moscow PROMYSHLENNOYE STROITEL'STVO in Russian No 3, Mar 82 pp 27-28

[Article by K. B. Isentayev, candidate of economic sciences and chief of the Regional Planning and Distribution of Productive Forces Section of Kazakh SSR Gosplan: "The Paramount Tasks of Effective and Integrated Development of the Mangyshlak TPK [Regional Production Complex]"]

[Text] It is known that interindustry production-process complexes, on the basis of which a whole system is formed, form the base of the activity of regional production complexes. As a rule, intrabranch and interbranch complexes are formed on the base of intensifying the processing of raw materials and the output of products of ensuing production-processing cycles.

Mangyshlak is becoming a major industrial region of the country, which furnishes crude oil, gas, plastics, coquina, fish and many other items to the country. The establishment of a regional production complex here is accompanied by the development of new cities--Shevchenko and Novyy Uzen' and the urban-type settlements of Beyneu, Yeraliyev, Shetpe, Mangyshlak, Zhetybay and Uzen'. The Mangyshlak TPK, whose enterprises--those operating and those under construction--have been joined by common sources of raw materials, is participating in the national division of labor with the oil and gas recovery and gas-treatment branches. The share of these branches in the total volume of gross output of the complex's industry is 80 percent. The recovery of crude here is extremely effective economically--the prime production cost per ton is lower than in a number of the country's other regions. The oil, gas and chemicals complex, which includes the recovery of oil and gas, gas processing and the production of plastics and plastic articles, promotes

solution of the problem of further integration of the branch. Development of the chemical industry--a new branch of specialization in the complex--is associated with the introduction into operation of the first phase of the plastics plant at Shevchenko.

In determining the paths of further development of the oil-recovery and the oil and gas refining industries and of the production facilities associated with them at the Mangyshlak TPK, the peculiarities of the new oil and gas fields (of the Buzachi Peninsula, the Caspian Sea shelf, and Paleozoic deposits), whose crude oil is different in its characteristics from the oil of well-known fields of West Kazakhstan, should be taken into account. For more complete use of all the components of Buzachi oil, which is unique in its composition, it is desirable to construct in Shevchenko an enterprise for intensive refining of it. Introducing such a plant into operation would allow not only greater depth and integration in the branch's refining of raw materials but also the solution of questions of integrated development of the TPK, the improvement of its branch structure, and further integration of the branch in a technologically consistent cycle of recovery and refining of raw material, which would enable conversion in the long term from the current predominant specialization in raw materials (the recovery of crude oil and gas) to diverse production specialization. The construction of a plant for refining crude intensively at Mangyshlak will solve the problems of providing the Shevchenko Plastics Plant with raw material and of satisfying the needs of the region for petroleum product, eliminating enormous expenditures for transporting product from other parts of the country. In so doing, other problems of no small magnitude also will be solved--organization of the extraction of paraffin from the crude of Uzen' and Zhetybay fields locally and the creation of production facilities for a new area--for the output of protein and vitamin concentrates, synthetic detergents and other things. And, as a result, the need for expensive preheating of the crude in order to transport it over the Novyy Uzen'-Kuybyshev pipeline would disappear.

As calculations indicate, a combining of the oil, gas, chemical and microbiologicals industries would reduce capital construction expenditures by 25 percent, operating expenditures by 40 percent.

The desirability of refining Mangyshlak oil locally is confirmed also by the geography of the long-term consumption of petroleum product, taking into account changes in the fuel-balance structure, including the expected growth of petroleum-product consumption in the region. Improvement of transport ties in the future also should be considered. Finally, it is necessary to consider the requirements of the developing petrochemical industry of Kazakhstan for raw materials and of the electric-power engineers of West Kazakhstan for fuel. Not only West Kazakhstan but also Astrakhanskaya Oblast and the Kalmytskaya ASSR of the Russian Federation, the Karakalpakskaya ASSR and Khorezmskaya Oblast of Uzbekistan, the northern regions of Turkmenia, and other areas can be viewed as possible consumers of Mangyshlak's oil-refining products. Everything that has been said indicates the necessity for a feasibility study of the desirability of refining locally part of the oil recovered at Mangyshlak.

Important reserves for raising the effectiveness of developing Kazakhstan's oil and gas industry, including Mangyshlak's, are a reduction in the time and social labor spent exploring oil and gas fields and achievement of the required interrelationships between the recovery of the raw material and preparation of the reserves thereof. Insuring high geological and economic effectiveness of geological

exploration is linked with the introduction of new methods for prospecting (integrated aerospace and direct geophysical and geochemical prospecting), the mastery of offshore drilling, with pilot prospecting for nonanticlinal-type traps (reefs, lithological deposits) and the selection of scientifically substantiated areas for prospecting and exploration. It is proposed to obtain a substantial portion of the growth in oil and gas reserves within the Mangyshlak TPK over the long term from the Kazakh shelf of the Caspian Sea. Computations indicate that the cost of preparing reserves in the water area will be lower than in Azerbaijan and Turkmenia. The expansion in prospecting and geological exploration in forthcoming years not only for oil and gas but also for other useful minerals will be of great significance in the more effective, integrated development of Mangyshlak's productive forces and in the creation of a reliable mineral raw-materials base.

Contemplated measures for developing services, auxiliary production activities and the nonproduction infrastructure also should help to raise the complex's effectiveness. The necessity for more intensive development of these branches is brought about by the special, difficult natural and climatic conditions of Mangyshlak and the definite isolation occasioned by its geographical location.

The developing economy of Mangyshlak requires the further improvement of transport. The construction of new highways and the reconstruction of existing ones are necessary. Further development of communications on Mangyshlak also is required. A special question for Mangyshlak is water supply, which can be improved in two ways--by increasing the distillation of seawater, and by delivering water from other regions, particularly from the Volga over the Uzen'-Kuybyshev oil pipeline, which is being done already. Apparently, the amount of water delivered over this pipeline must be increased, and it must be purified in order to deliver purer water to Mangyshlak.

The Mangyshlak TPK should, in the long term, participate in the production of consumer goods. There are great possibilities for this purpose--wastes have appeared at the Shevchenko Plastics Plant, and there are local materials--varicolored coquina, wastes from cattle processing, and so on. And questions of development of the foodstuffs complex also require solution.

Effective functioning of the social infrastructure on the peninsula can be insured only with greater acceleration in development of the production sphere. As never before, stable living conditions should be created at Mangyshlak in order to make up for work-force losses and for purposes of education and raising qualifications. In so doing, it should be considered that the TPK's requirement for labor resources up until now has been satisfied basically through immigration. But in recent years an outflow of people from certain regions of the TPK has started, with the creation of a corresponding shortage of labor resources, which is explained partially by the inadequate level of integrated services for the populace, which help to retain personnel. A definite disproportion in providing the populace with facilities for social, cultural and personnel-amenity purposes is observed.

Solution of the indicated questions will depend greatly upon the pace of capital construction. The capacity of Mangyshlak's construction organizations does not correspond to the growing demands for development of the TPK. It is necessary to work out special measures for developing a capital construction base and for creating adequate capacity for on-time construction and introduction of all facilities of the production and nonproduction spheres.

During the 11th Five-Year Plan measures are planned for strengthening the production base of construction organizations and for promoting building-materials industry enterprises. The housing-construction combine in Shevchenko is being restructured and converted for purposes of producing improved series of apartment houses. The construction-industry base for Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] enterprises is being rebuilt and developed, and a base for the rural builders is being established. Work is being done to expand the output of wall and facing materials made of coquina from the unique Zhetysay field. It is planned to build a brick plant in the Shetpe region. The pace of construction of facilities for nonproduction purposes is being increased. It is planned to introduce into operation general-education schools for 10,300 students, kindergartens and nurseries for 5,600 children, hospital institutions rated for 1,200 beds, and a number of other facilities.

Mangyshlak is becoming a region where the economy and culture are being developed intensively, capital construction is going on at an accelerated pace, and attractive cities and settlements are rising up. Steps must be taken to insure that these cities and settlements will be distinguished by special attractiveness, having their own individual faces, which characterize their specifics. For each city and settlement on Mangyshlak is being developed on the basis of a special urban-development element, and this should find expression also in its architecture. The creation of zones of green plantings, parks, squares and a local base for dairy products and fresh vegetables is of great importance. Everyone who lives under these complicated climatic conditions needs the requisite comfort and good services.

The integrated solution of all the problems examined will promote a further rise in the effectiveness of developing the Mangyshlak TPK, in light of the tasks set by the 26th CPSU Congress.

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#### Construction's Role

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[Article by M. Khusnutdinov, Deputy USSR Minister of Construction of Petroleum and Gas Industry Enterprises: "The Motherland Needs West Kazakhstan's Oil Riches"]

[Text] Not so much time has passed since the first tanker cast off from the oil-filling platform of the Shevchenko port on the Mangyshlak Peninsula, carrying in its holds the first 5,000 tons of "black gold." The oil had been recovered in the Buzachi region and delivered to the loading point over a new oil-transport arterial erected by a Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] organization.

The oil-transport system, which includes the Kalamkas-Karazhanbas, Karazhanbas-Tauchik and Tauchik-Shevchenko arterials, has been extended for hundreds of kilometers, crossing the Buzachi and Mangyshlak Peninsulas. It was erected on time, outstripping the norms by far. The work was carried out in unison: the means for electrochemical protection, large pump stations, heat-exchange and preheating installations, roads, housing settlements and communications lines were put into operation together with the pipelines, and the facilities at the fields were built up.

Large oil-industry enterprises at Buzachi, which are a component part of the Mangyshlak Regional Production Complex and the intensive development of which was planned by the 26th Party Congress, are important construction projects of the industry in the North Caspian. The best collectives of Mangyshlakneftegazstroy [Mangyshlak Trust for the Construction of Oil and Gas Industry Enterprises], Sredazneftegazmontazh [Central Asian Trust for the Erection of Oil and Gas Industry Facilities], Sredazneftegazstroy [Central Asian Trust for the Construction of Oil and Gas Industry Facilities], and Shatlykgazstroy [Trust for the Construction of Gas Industry Facilities] and other organizations that are operating in the region, were sent here.

Advanced workers in the competition have achieved a high pace in and high quality of construction and installing work, both in linear construction and in the buildup of facilities at the oilfields and the erection of other surface facilities. The builders have completed an authentic labor achievement, having opened up the road for the "black gold" of the new oil-bearing region to petroleum refineries in the western and central parts of the country. This was done under the most difficult of conditions.

Yes, conditions in the Mangyshlak Regional Production Complex area are difficult, to say the least. It is not easy even to choose an appropriate epithet for the environment in which the builders have managed to live and work. These are characteristic of the region: there are no rivers and the peninsula is, for the most part, a barren, dry steppe that is hilly in places, with salt-marsh lakes. In addition to that, the climate is sharply continental. This means debilitating heat and hot hurricane winds in the summer and sand-and-snow blizzards and cold that reaches -40 degrees in the winter.

While building the pipeline system, a number of complicated technical problems were solved. High-capacity preheating installations that allow dependable passage of the hydrocarbon raw materials and of fuel to the customers were created and introduced.

The first stage in developing the oilfields has been completed, but the construction project continues. "The Main Directions for the Economic and Social Development of the Country During the 11th Five-Year Plan" states: "...speed up development of oilfields on the Buzachi Peninsula." And these are important elements of the Mangyshlak Regional Production Complex. Ahead is truly gigantic work to execute planned tasks, which are called upon to greatly increase West Kazakhstan's fuel and power potential.

The rapid pace of the assimilation of the Mangyshlak's natural wealth is the result of the party's and the government's great concern about developing productive forces and about a blossoming of the country's economy. New principles of planning and economic incentives and the party's measures for improving management have opened up wide horizons before the pioneers of Mangyshlak and Buzachi and are helping the growth of the people's creative initiative. And, glancing ahead at tomorrow, in planning the progress of forthcoming operations, we naturally do not forget about the experience of past years, and we take into our armory everything valuable gained by the production collectives that know how to reduce standard construction periods under the most difficult conditions.

I want especially to pay attention to the organizational aspect of the matter. Again and again my memory returns to that period when, despite all the efforts of the various working elements, the pace of work on the route and the building up of the fields' facilities were held back markedly in their growth and an absence of unity in the work of various agencies was noted. Everyone understood the general task, but the paths to its fulfillment were varied.

Studies were completed for the development of a document completely new for us--a decree of the Bureau of the Mangyshlak Oblast Committee of the Kazakhstan Communist Party, the Executive Committee of the Mangyshlakska Oblast Soviet of People's Deputies, and the Board of the Ministry of Construction of Petroleum and Gas Industry Enterprises, "On Additional Measures to Insure the Introduction into Development of the New Oil Fields on the Buzachi Peninsula of Mangyshlakska Oblast." It served as an organizational beginning for the collectives of builders, installers and operators.

The decree covered in integrated fashion all aspects of the problem of developing the underground riches: it defined accurately the prerequisites for introducing facilities for Buzachi ahead of schedule--roads, power lines, electric-power substations, water lines, gas pipelines, oilfield-facility structures, the Kalamkas-Karazhanbas-Shevchenko trunk oil pipeline, oil pumping stations, housing and facilities for social, cultural and personal-amenity purposes. This document called for measures that had to be carried out by oblast organizations. There were, for example, these clauses: allocate local building materials for the buildup of the fields' facilities; assign workers for the strengthening of construction organizations; provide for an uninterrupted supply of food and of the necessities for all the temporary rotating-personnel settlements and for round-the-clock feeding of workers during the construction of oil pipeline and oilfield facilities.

Concreteness and expeditiousness characterized the planned measures. Of help here was the fact that, prior to approving them, we discussed each clause with the communists of the oblast organizations and the managerial workers, and the more important clauses were discussed in the labor collectives. Oblneftesnab [oblast petroleum-product supply administration], the oblast's motor-vehicle administration, obltorgupravleniya [oblast trading organization], obl'sel'khoztekhnika [oblast agricultural equipment association] and the Mangyshlak Aviation Enterprise approached compilation of the measures with an understanding of the importance of what had been planned. Here they accurately figured the reserves and capabilities, established strict monitorship over fulfillment of the measures, and constantly listened to responsible comrades. If the managerial workers were not able to do something, the party organizations or the soviet organs extended assistance to them. Of course they did not replace the managerial workers, they did not engage in details, which often fell upon our shoulders, and they operated with their own methods and means. And, it must be said, very effectively. In a short time the builders of the oil pipeline went onto the schedule, they promoted work on erection of the Kalamkas oil pumping station, facilities of the Kyzylkum fresh-water field were built up and put into operation, and the delivery of reinforced-concrete structure to the site was speeded up. And other lagging sections were tightened up.

The 300-km Shevchenko-Karazhanbas-Kalamkas road between the operating fields became the "road of life" on the Buzachi. This most important facility was built in a short time by the collective of the Kazakh SSR Minavtodor [Ministry of Highways] road-building trust. Machinery, equipment, building materials, structure and

housing have been going in a continuous stream over the new road, putting an end to the lack of roads at Buzachi. A no less important task was that of providing the peninsula with electricity. A LEP-220 [220-kV power transmission line] between Shevchenko and Kalamkas was put into operation. Two power substations and power transmission lines to the oilfields have been built. Oblast organizations allocated the necessary materials, transport and worker personnel for these jobs.

There is no fresh water on the peninsula. To bring it in by tank car is expensive and unreliable. Permanent stationary water-supply sources were needed. Tens of wells were drilled in the desert and electric power was brought to them. All the sections of construction have now been provided with the life-giving moisture.

The oil-pipeline pump stations are being erected in outfitted-module versions. There are no local building materials on Buzachi, so reinforced concrete, brick, cement and so on are imported. Doing so is not economical. It was necessary to organize at industrial enterprises the manufacture and prefabrication of box modules, to ship them to the sites, and to erect the pump stations on the basis of them. The prefabrication of box modules at oblast enterprises was organized at the initiative of the CPSU oblast committee and the oblast executive committee.

All these measures were carried out by the deadlines called for by the joint decree.

The bureau of the party's oblast committee and the executive committee of the oblast's soviet of people's deputies have been constantly interested in the state of affairs in construction. Members of the bureau, the ispolkom and Minneftegazstroy met regularly to discuss various urgent questions, to find ways that would allow the pace of construction and installing operations to be speeded up. The party's rayon committees and the executive committees of the rayon soviets, the party committees, and the primary party organizations were involved in the execution of what had been planned. The Kazakhstan Communist Party Central Committee and its secretary extended assistance to us daily. And not just in solving managerial or organizational tasks. Ideological-education work was brightened up in the construction sections, and lecturers, propagandists and agitators, writers and poets, artists of the theater and amateur performers went out to the pipeline-route workers.

The joint efforts and coordination of the actions of party and soviet workers and economic supervisors bore good fruit. The Mangyshlakneftegazstroy collective prepared the necessary work front for erection of the oil and gas gathering installations, the booster pump stations, the oil-gathering grids and other facilities for the subcontracting organizations on time. The volume of construction and installing work for the year grew by almost 50 percent, and output per worker increased by 34 percent.

The Shatlykgazstroy collective built the Kalamkas terminal pump station with a substantial reduction of time. It spent 9 months on it instead of the standard 16 months. The station was turned over for operation with an "excellent" evaluation. An analysis of organization of the production process and of progress of the work once again confirmed the advantages of the outfitted-module method of construction, which had been recommended for Buzachi by the ministry's engineering council. The pump station was built by the expeditionary rotating-personnel method. The construction participants strictly observed the schedule, which had been coordinated

with Sredazneftegazmontazh installers, and they worked in close interdependence with the operators of 'Glavtransneft' [Main Administration for Oil Pipeline Transport] of Minnefteprom [Ministry of Petroleum Industry].

Success also accompanied the Sredazneftegazstroy builders, who, under the most difficult conditions, laid the 277-km Kalamkas-Shevchenko trunk oil pipeline ahead of time. For example, they built the Kalamkas-Karazhanbas section in 5 months instead of the 7 months specified in the standards.

Originally it had been planned to concentrate five integrated technological flow-line groups at this construction project, but during the work process we were convinced that a better option was three flow-line groups. This was an optimal organizational solution. It enabled the technological process to be arranged with precision, and unnecessary commotion and hubbub to be avoided. Hundreds of thousands of rubles of state funds were saved.

Engineering preparations on the route ahead of time also permitted the construction time to be reduced. Specialized brigades that went ahead of the insulating and pipelaying column overcame natural and manmade obstacles, and there were many of them (the pipeline crosses more than 80 ravines that are 200-300 meters wide, and roads). Experience previously gained by the industry in cleaning the inside of the pipeline, in testing individual sections, and in expelling water with oil was used during erection of the trunk pipeline. In integrated fashion and practically simultaneously, the builders were able to test the pipeline, to fill it with oil, and to displace or impel the water forward for testing of the next sections of the pipeline.

A detailed analysis of the work done and the organizational measures employed that aided introduction of the facilities ahead of schedule helped in getting a deeper understanding of today's problems and in discovering the causes of miscalculations and the lack of coordination which are still encountered at construction projects.

During the 11th Five-Year Plan a large amount of work will be done in West Kazakhstan on deep exploratory and developmental drilling. The builders will always go along with the drillers, and already the feasibility study for the integrated building of the first phase of the facilities for the Zhanazhol oilfield has been prepared, work is being done on the buildup of facilities for the Tengiz oilfield, and documentation is being readied for the Karachaganak gas-condensate field. I will note that corrosion-resistant equipment is required when recovering fuel at these places. Accordingly, transporting of the oil has been made complicated. Consequently, the builders face especially difficult tasks. And the amount of work is great. The erection of oil and gas recovering enterprises and of trunk pipelines over which not only oil and gas but also fresh water and seawater will be sent, and, finally, of gas refineries, construction-industry enterprises, rotating-personnel settlements, housing and other facilities for nonproduction purposes--all this has been changed to our ministry's subunits.

One of the most important problems of the integrated establishment and development of the oil-recovery base in this region is the delivery of fresh water for production and domestic needs. As research has indicated, there are no reliable sources of fresh water for the oil facilities of West Kazakhstan that are capable of covering the rising volume of water consumption. Yuzhgipronefteprovod [State Institute for the Design of Oil Pipelines in the Soviet Economic Region] and KazNIPIneft'

[Kazakh SSR Scientific-Research and Design Institute of the Oil Industry] have developed feasibility data on construction of the Volga-Mangyshlak pipeline. It will pass parallel to the existing Uzen'-Kuybyshev oil pipeline. This will allow the water pipeline to be built and operated at least expense. This work, of course, will require detailed, comprehensive preparation, and we should undertake it right now.

We have all the grounds for counting on the prescheduled introduction of the facilities intended for turnover during the 11th Five-Year Plan. "Tasks for the production of fuel and energy should be surpassed," Comrade Leonid Il'ich Brezhnev noted at the November 1981 CPSU Central Committee Plenum. These words were taken by the industry's builders and oil-recovery complex workers as a direct appeal to them, and, consequently, as guidance for action.

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